Mining CONGRESS JOURNAL

DECEMBER 1955

Season's Greetings

CAL-WIC INDUSTRIAL SCREENS

Today, as never before, Cal-Wic Industrial Screens are being used in the expanding construction industry of America. Contractors know they can depend on Cal-Wic Screens because they are tailor-made for accurate sizing and long life, resulting in less downtime and greater production.

Every phase of production of CF&I Cal-Wic Industrial Screens is checked by exacting quality controls to assure that highest standards are maintained. The steel used is specially-selected, basic open hearth steel which has the right balance between hardness and toughness. Cal-Wic Industrial Screens are then woven on powerful looms. They have tight wire intersections and openings that will retain their original size.

There's a CF&I sales engineer always within easy reach . . . ready to give you prompt assistance with any operating problem that might arise. For complete details, contact our nearest District Sales Office.

CAL-WIC
INDUSTRIAL SCREENS
THE COLORADO FUEL AND IRON CORPORATION
CF&I

3612

Albuquerque • Amarillo • Billings • Boise • Butte • Casper • Denver • El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Los Angeles
Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane • Wichita
CANADIAN REPRESENTATIVES AT • Calgary • Edmonton • Montreal

75 YEARS OF BUCYRUS-ERIE LEADERSHIP . . .

December 18 marks Bucyrus-Erie's 75th Anniversary. In the years since 1880, the company has been proud to bring many significant advancements to the design of excavators . . . the first electric and the first diesel excavators . . . the first crawler-mounted dragline . . . the first heavy-duty, full-revolving quarry and mine shovel . . . and too many more "firsts" to detail here. Most important, however, the know-how back of these is yours in whatever Bucyrus-Erie machine you use.

President Theodore Roosevelt Visits Panama Canal: This Bucyrus-Erie shovel, one of 77 used on the Big Ditch, was included in his 1908 inspection tour.

This Bucyrus-Erie 1050-B shovel swings a big 45-cu. yd. dipper, keeps overburden costs low for Ohio coal mine.

. . . GIVES YOU TOP PERFORMANCE TODAY . . .

You can expect top performance from a Bucyrus-Erie excavator because its *built right in* — from the ground up. Bucyrus-Erie has pioneered the use of Ward Leonard control which gives the operator smooth, efficient control over all operating functions. Front end provides strength to withstand shock loads of digging, yet is remarkably light in weight to hold down swing inertia. Main machinery is simple and strong for most efficient operation and long service life. The extras Bucyrus-Erie puts into the design and construction of excavators pay off many times over in added output and lower cost operation.

. . . PROMISES EVEN BETTER EXCAVATORS TOMORROW

You can expect even higher performance standards from Bucyrus-Erie excavators in years to come. The development of new and improved designs, and the search for better materials and more efficient manufacturing methods never ends. With facilities unsurpassed in the industry, Bucyrus-Erie promises you excavators that will serve you better than ever. 22Y55C

1880 BUCYRUS ERIE *1955*

South Milwaukee, Wis.

75 Years of Service to Men Who Shape the Earth

push your coal production UP

with this hard-working JEFFREY team

Jeffrey 70-UR Universal Cutter for bottom, top and shear cuts

Head and cutter can be rotated 360° in either direction and positioned to make any kind of cut, any place in the seam. From one location, the 70-UR Cutter makes a 30-foot horizontal cut (using a 9-foot cutter bar) or a shearing cut 5'5" to either side of the machine's centerline. No wonder mine superintendents brag about its tonnage-producing ability!

Operators report smooth and positive traction for sumping, even when cutting at extreme range. The 70-UR's wide wheel gauge, long wheel base, low center of gravity and large pneumatic tires give sure-footed stability. Maintenance men say that its rugged construction reduces downtime and cuts upkeep costs.

Jeffrey 81-A Loader for high capacity loading

From both a production and a maintenance standpoint, the 81-A Loader is a superior machine. It is well balanced and flexible, and is easily maneuvered; trams at 137 FPM and can be turned in its own length. The conveyor swings 45° either side of center and elevates properly to load shuttle cars on the straight and in break-throughs. It has a rated capacity of 8 TPM and a maximum capacity of 10 TPM.

Maintenance is simplified on the Jeffrey 81-A Loader because every motor and gear case is a separate, detachable unit. This kind of unit construction is used throughout, resulting in rapid replacements and lower upkeep costs.

Jeffrey 56-FHR Face Drill for shot hole drilling

This single-boom drill provides a high degree of operating flexibility. It is rubber-tire-mounted and self-propelled by two hydraulic motors. Another operates the cable reel. The drilling head can be swung by finger-tip control to any desired position for shot hole placement. Drilling range is 7′2⅝″ vertically and 13′1¾″ horizontally.

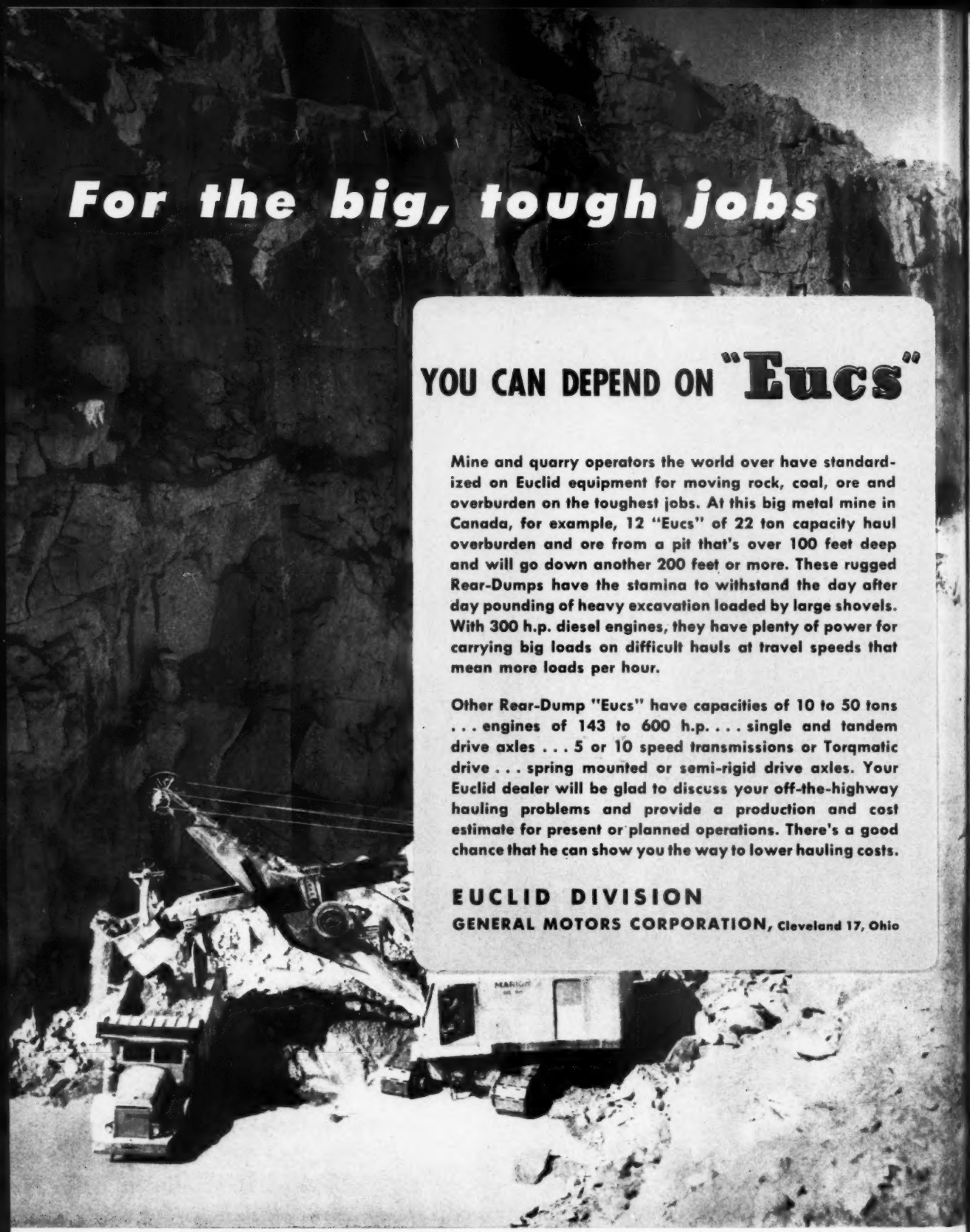
The auger can be withdrawn by power without reversing the direction of rotation of the auger. This action clears the hole of all cuttings, leaving it ready for insertion of the powder or blasting cartridge.

OTHER JEFFREY EQUIPMENT FOR UNDERGROUND SERVICE:

Continuous Mining Machines • Conveyors • Shuttle Cars • Locomotives • Fans and Blowers
Descriptive literature sent upon request. The Jeffrey Manufacturing Co., Columbus 16, Ohio

JEFFREY

MINING • CONVEYING • PROCESSING EQUIPMENT
TRANSMISSION MACHINERY • CONTRACT MANUFACTURING



For the big, tough jobs

YOU CAN DEPEND ON "Eucs"

Mine and quarry operators the world over have standardized on Euclid equipment for moving rock, coal, ore and overburden on the toughest jobs. At this big metal mine in Canada, for example, 12 "Eucs" of 22 ton capacity haul overburden and ore from a pit that's over 100 feet deep and will go down another 200 feet or more. These rugged Rear-Dumps have the stamina to withstand the day after day pounding of heavy excavation loaded by large shovels. With 300 h.p. diesel engines, they have plenty of power for carrying big loads on difficult hauls at travel speeds that mean more loads per hour.

Other Rear-Dump "Eucs" have capacities of 10 to 50 tons . . . engines of 143 to 600 h.p. . . . single and tandem drive axles . . . 5 or 10 speed transmissions or Torqmatic drive . . . spring mounted or semi-rigid drive axles. Your Euclid dealer will be glad to discuss your off-the-highway hauling problems and provide a production and cost estimate for present or planned operations. There's a good chance that he can show you the way to lower hauling costs.

EUCLID DIVISION
GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

EUCLID

GM
MORE POWER FOR YOU

DECEMBER, 1955

VOLUME 41 ● NUMBER 12

Mining CONGRESS JOURNAL

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All costs considered -- belt conveyors by LINK-BELT are your most effective means to

GREATER TON-MILE ECONOMY

Efficient, economical handling of bulk materials is provided by this 260-ft. Link-Belt conveyor with 24-in. wide belt. These conveyors can travel up or down grades as steep as 32%.

For large or small systems -- you get unrestricted selection of components and unmatched engineering background

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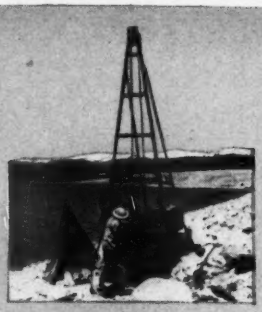
Your Link-Belt office will gladly fill in details on how belt conveyors can lower your handling cost per ton-mile. Call today.

Bearings, drives, supports and enclosures as required in this installation are also made by Link-Belt. Availability of all elements from one source saves delays and complications.

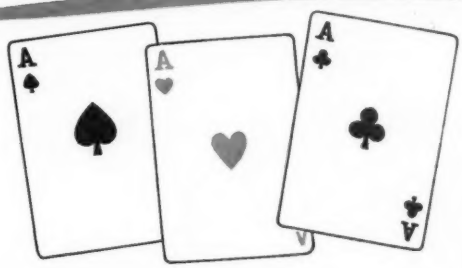
LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13.958



When you're CORE-DRILLING, it's no gamble with these 3 aces in the hole



JOY Diamond Core Drills When these three "aces" go into the holes, luck no longer is a factor. They are a sure bet to tell you exactly what is down there. And, at Joy, you can find the right "ace" to do the best job for you.

With maximum capacities ranging from 500 to 2000 feet, there are Joy diamond drills applicable to almost any coring job. And they'll do the best job for you. Here's why . . .

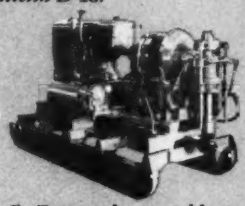
EXTREME PORTABILITY Skid mountings, compact design, and rugged construction make it possible to drag Joy diamond drills into some of the most inaccessible locations.

VERSATILITY Because they are available with either hydraulic or screw-feed swivelheads and with a choice of gasoline, electric or air power, Joy core drills can fit into any drilling program without expensive preparations.

Check your drilling needs against this group of outstanding drills. One of them will be suitable to your needs and it will do an accurate, economical job of proving the mineral value of your property. Write today for literature on the machine you need to **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

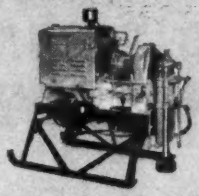
22-HD The rugged, heavy-duty model. Capacity—2000' with EX fittings. Also available as truck-mounted drill or on twin-column mount for underground operation. Bulletin D-28.

1



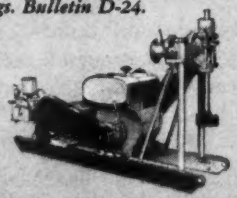
12-B Extremely portable, weighs approximately 1200 lbs. Capacity—1000' with EX fittings. Also available on twin-column mount with air motor drive for underground operation. Bulletin D-21.

2



No. 7 The lightweight, easily transportable model. Can be taken underground or transported by airplane, boat, or even muleback into remote areas. Capacity—500' with EX fittings. Bulletin D-24.

3



CONTRACT CORE DRILLING *Sub-surface test borings for mineral prospecting, foundation drilling, and grout hole drilling are available on a contract basis. Highly skilled crews and complete stock of core drills, bits, and accessory equipment are maintained at all times.*

Consult a Joy Engineer

W&D M5508

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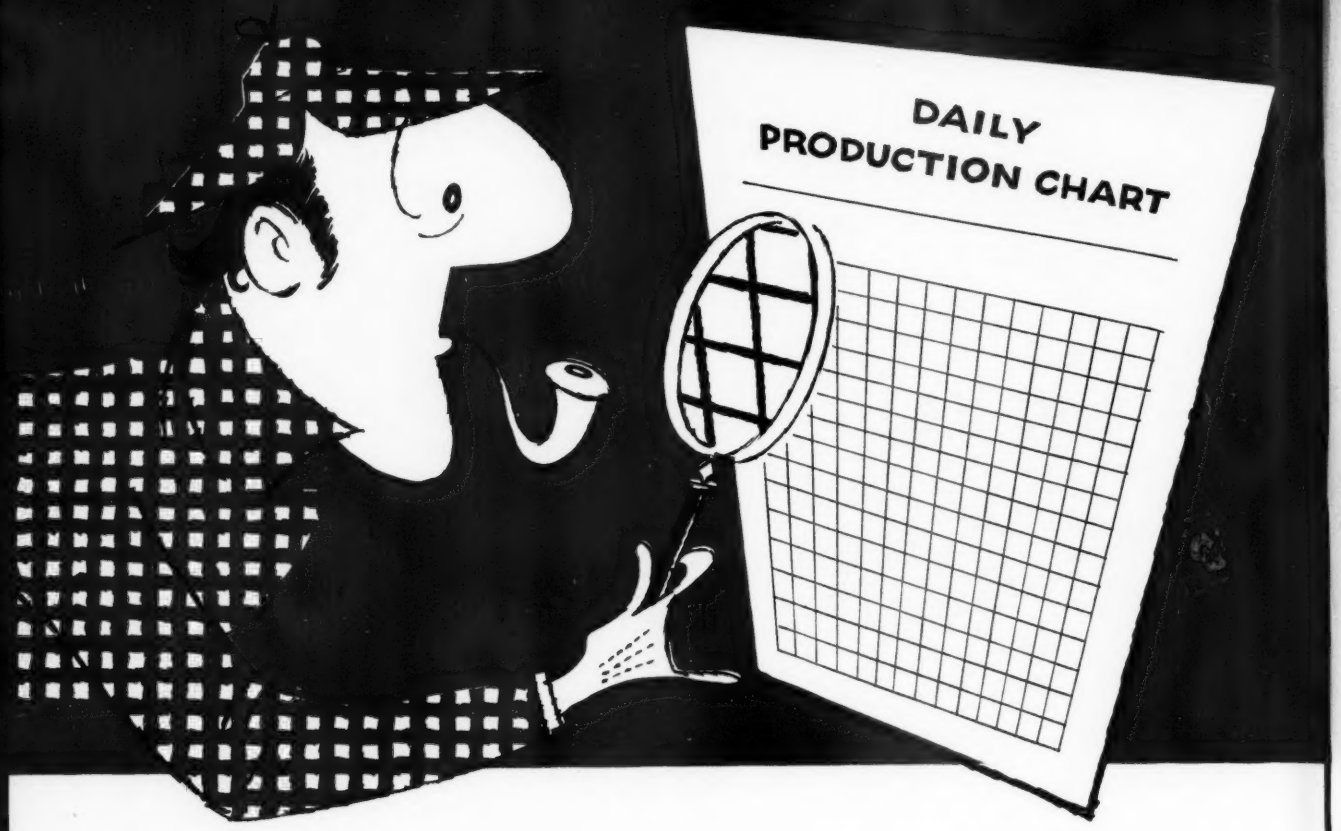
WORLD'S LARGEST MANUFACTURER OF CORE DRILLS AND MOTORIZED DRILL RIGS SINCE 1851



The case of the invisible breakdown

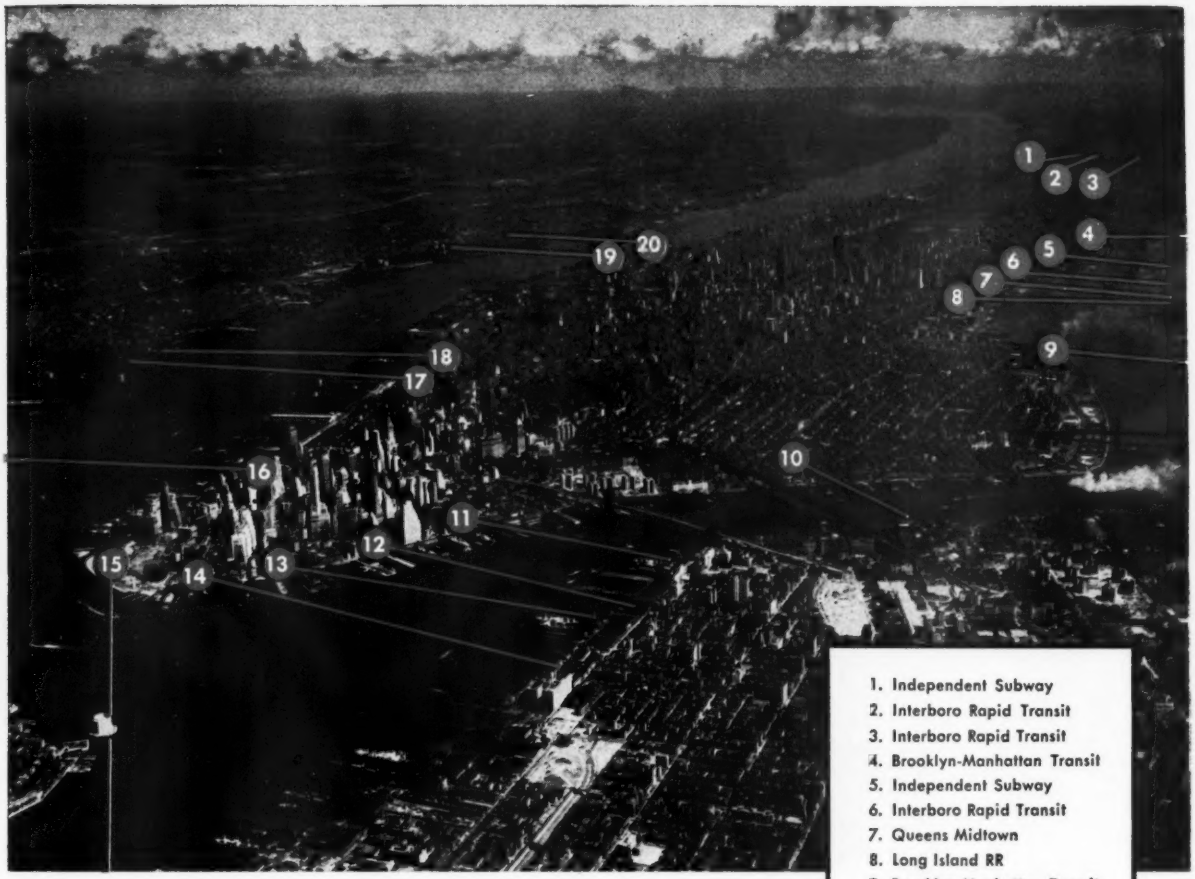
Once upon a time something very strange happened. A company had a breakdown in their coal haulage system. But do you know... nothing bad ever showed up in their daily production records! That's because this company relied upon an acf Mine Car System. The damaged car was simply switched to a siding... and the rest of the load sped along.

What the records do show... especially the cost-per-ton records... is the opportunity for increased earnings that acf Constant Haulage offers you. Besides extra dependability and flexibility to safeguard your production ... they provide two-way payloads and low cost operation. acf standard cars give you the advantage of non-stop unloading, and acf *Articu-Trip* cars permit fast, continuous loading.

Actual cost and production records... supplied by mine operators... will prove to be profitable reading for you. Why not ask your friendly acf Representative to show you some typical case histories soon!

AMERICAN CAR AND FOUNDRY DIVISION, acf Industries, Incorporated. *Sales Offices:* New York Chicago · St. Louis · Cleveland · Washington · Philadelphia San Francisco *Plants:* Berwick, Pa. · Milton, Pa. · St. Charles, Mo. · St. Louis, Mo. · Huntington, W. Va.

acf **MINE CARS** *for Constant Haulage*



1. Independent Subway
2. Interboro Rapid Transit
3. Interboro Rapid Transit
4. Brooklyn-Manhattan Transit
5. Independent Subway
6. Interboro Rapid Transit
7. Queens Midtown
8. Long Island RR
9. Brooklyn-Manhattan Transit
10. Independent Subway
11. Independent Subway
12. Interboro Rapid Transit
13. Brooklyn-Manhattan Transit
14. Interboro Rapid Transit
15. Brooklyn Battery Tunnel
16. Hudson & Manhattan RR
17. Holland Tunnel
18. Hudson & Manhattan RR
19. Pennsylvania RR
20. Lincoln Tunnel

Underground Life Lines of Manhattan

Third Lincoln Tube now brings total to 41... drilled with Ingersoll-Rand equipment

TWENTY vehicular tunnels now link Manhattan with the mainland, New Jersey and Long Island. Each tunnel consists of two separate bores. A third bore now being added to the Lincoln Tunnel will bring the total to 41. It will also keep Ingersoll-Rand's 79-year-old record intact. For here, as on all other Manhattan tubes since the very first one, Ingersoll-Rand drills have been used on the rock work.

The western end of this new Lincoln tube calls for driving through rock approximately 750 ft. of 34 ft. circular tunnel. It is being driven in two sections from the bottom of a shaft 130 ft. deep. After careful consideration of all modern tunnel driving methods, I-R Jackdrills and 1⅜" Carset Jackbits were selected for driving the top heading. The bench will be driven by Ingersoll-Rand Wagon Drills.

When it comes to drilling rock, remember that I-R can supply everything you need from the bit all the way back to the compressor. Let your Ingersoll-Rand representative help plan your next rock job. His experience may be of great value to you.

5-91

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

ROCK DRILLS • COMPRESSORS • AIR TOOLS • TURBO BLOWERS • CONDENSERS • PUMPS • OIL & GAS ENGINES

SLOTTED BOLT...OR HEADED BOLT

either one gives you a sound, dependable roof

Mine roof bolts minimize the possibility of serious roof falls, as well as increasing production through more efficient use of mechanized equipment. Bethlehem makes mine roof bolts in two types: (1) a slotted bolt, used with a wedge, and (2) a headed bolt, used with an expansion shell.

Either type supplants old-fashioned supports, and can be used in conjunction with roof plates and Bethlehem roof ties. If you'd like more information about how these bolts can be used in your safety program, please call the nearest Bethlehem sales office.

SLOTTED BOLT An ideal roof bolt where maximum strength is desired. Also suitable for pillar bolting. Comes with 6-in. slot, forged without loss of metal, and a steel wedge. Opposite end of bolt has 5 in. of rolled threads. Wedge is forced deep into slot, spreading bolt ends, when bolt is driven.

SQUARE-HEAD BOLTS (Used with expansion shell) Furnished in three types: a ¾-in. carbon-steel bolt and a ⅝-in. high-strength bolt, each with typical breaking load of 24,000 lb, and a ⅞-in. high-strength bolt, with a typical breaking load of 45,000 lb. These bolts are used with hardened washers, which prevent tearing of metal when pneumatic impact wrenches are used.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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BETHLEHEM STEEL

BETHLEHEM STEEL

Wire rope lasts as long as the wire it's made of!

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1105

HAS THE CAPACITY TO ENDURE...
AND

Royal Blue

WIRE ROPE
IS MADE OF 1105!

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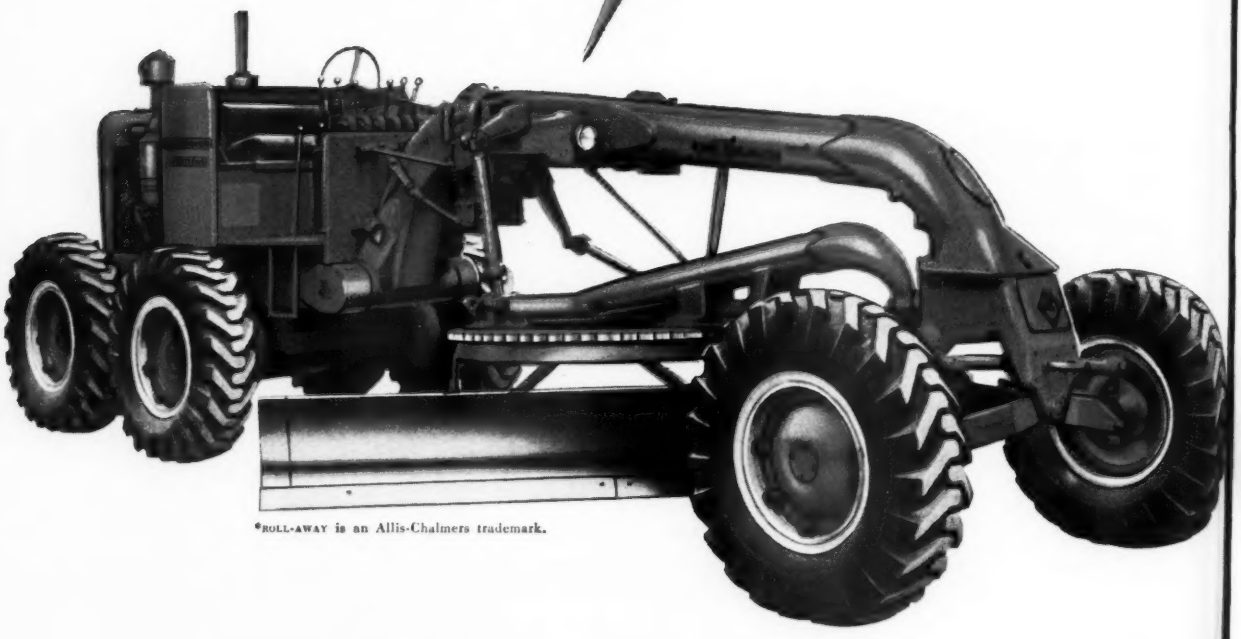
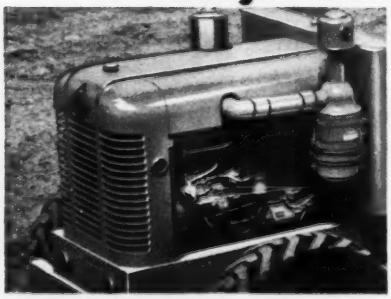
NEW OPERATING EASE AND COMFORT

ALLIS-CHALMERS BIG NEW

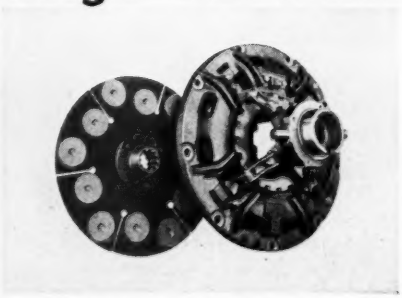


*ROLL-AWAY is an Allis-Chalmers trademark.

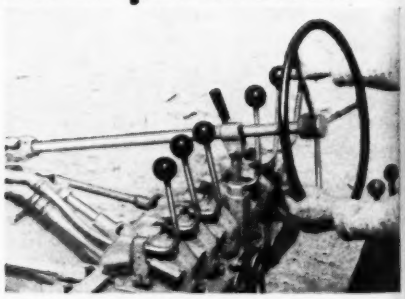
Major advantages that mean more production ... le



Powerful new Allis-Chalmers diesel featuring exclusive "follow-through" combustion for smooth performance, clean combustion, extra-long life.



Exclusive new ceramic clutch lining sets new standards of long clutch life, keeps clutch operating longer between adjustments, reduces lever pull.



All-new toggle-type controls give a *Forty Five* operator precision control with positive "feel" — in addition to easy finger-tip action regardless of load.

Forty Five MOTOR GRADER

120 HORSEPOWER • 23,800 POUNDS

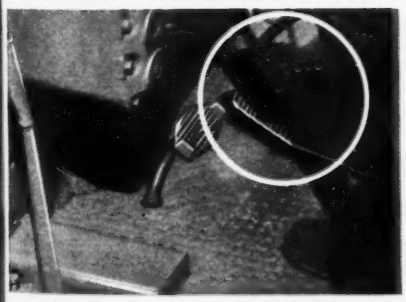
The *Forty Five* is a truly modern heavy-duty motor grader . . . designed for progress and built to *today's* standards of accuracy, dependability, operating ease and low cost. On road construction or maintenance work, you'll see all the advantages of balanced power, weight, traction and proper speeds . . . plus brand new advantages for the operator and mechanic that no other heavy-duty grader offers.

We invite you to check the features shown here. Then for the full story on the *Forty Five* — including extra-big clearances, exclusive ROLL-AWAY* moldboard, single-member tubular frame and fully enclosed power steering —see your nearby Allis-Chalmers dealer.

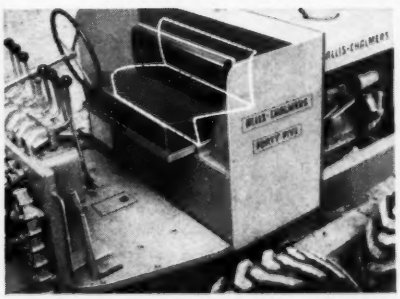
CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

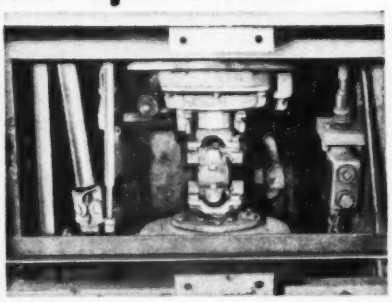
. . . less maintenance . . . easier and better operation!



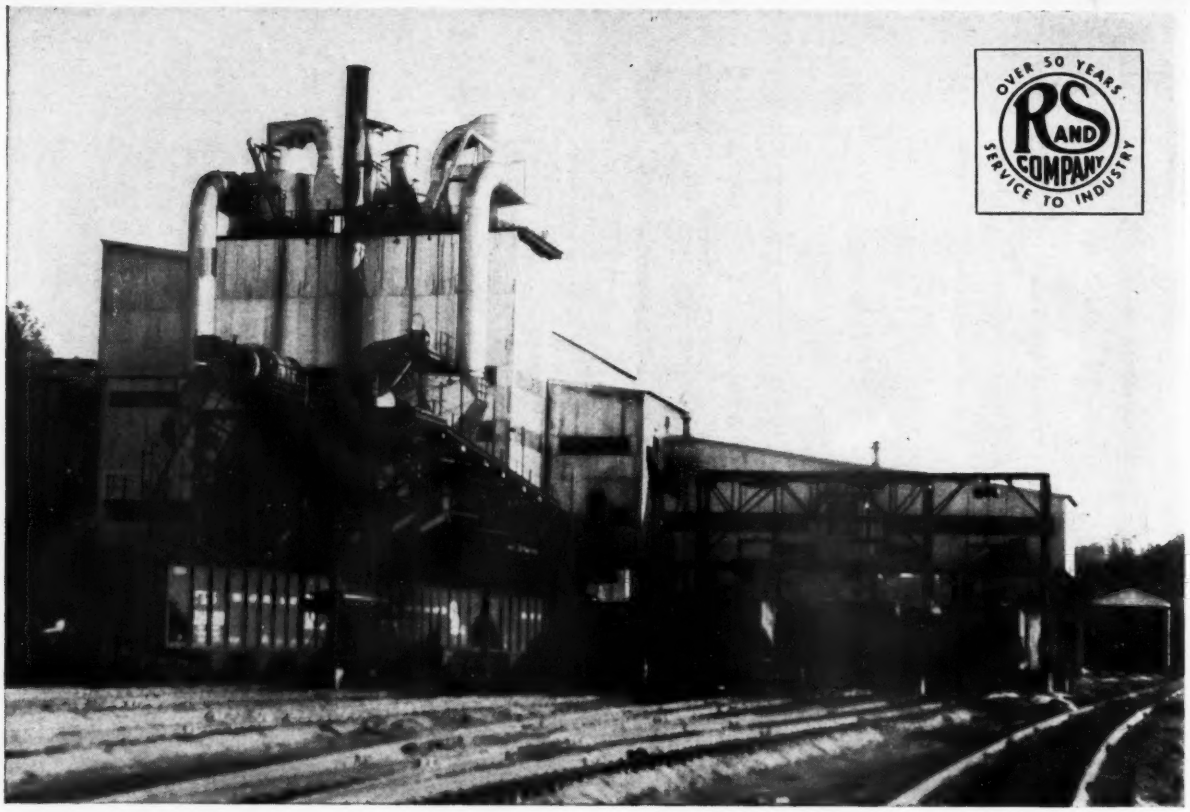
New accelerator-decelerator pedal lets the operator increase or decrease engine speed with his foot — without changing his hand throttle setting.



"Box seat" comfort and visibility. Foam-rubber seat adjusts for sit-down or stand-up operation. Flat, roomy platform has tapered corners for top blade visibility.



Matchless servicing accessibility. Unit construction permits easy service or removal of clutch, transmission or engine without disturbing adjacent parts.



now in full production

ROYALTY SMOKELESS COAL PREPARATION PLANT

- *Owner*—A. T. Massey Coal Co., Inc.
- *Location*—Clifftop, Fayette County, West Virginia—a new seam in a previously unmined area of West Virginia.
- *Operation*—complete washing, drying and screen sizing.
- *End-products*—a premium metallurgical coal in a wide range of sizes.

• *Engineering and Construction* —

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BUILT TO BE ABUSED...

It's U. S. Matchless® Wire Braid Air Hose!

This is the hose engineered specifically for hard rock mining, quarrying and tough construction work anywhere in the world—designed by men who *know* what a hose must do.

U. S. Matchless Wire Braid Hose is an all-purpose hose. It can take the highest required working pressures for both air and water, and is built to take the abuse and abrasion encountered in the roughest working conditions. Highly flexible and easy to handle. Never needs cribbing.

Constructed with a Neoprene tube overlaid with high tensile steel wire braid. Top quality brown natural rubber cover. Has extremely high adhesion to carcass.

No matter what your hose requirements are, United States Rubber Company can fill them. Here's where quality pays off—and demonstrates that money is wasted when spent on cheaply-constructed, short-lived hose. Expert "U. S." engineers will aid you in your hose selection and engineering problems. Call any of the 27 "U. S." District Sales Offices.

"U.S." Research perfects it . . . "U.S." Production builds it . . . U.S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

Cuts and loads 7 tons of coal per minute, with TIMKEN® bearings taking tremendous thrust loads

ITS cutting arms rotating at 14 rpm, the rugged Goodman 500 Miner slugs 13′2″-wide paths through solid, unprepared seams, cuts and loads up to 7 tons of coal per minute.

The main work of cutting is done by a pair of auger-like pilot cones and six long cutting arms that hold the bits. Taking the tremendous thrust loads on their shafts are Timken® tapered roller bearings.

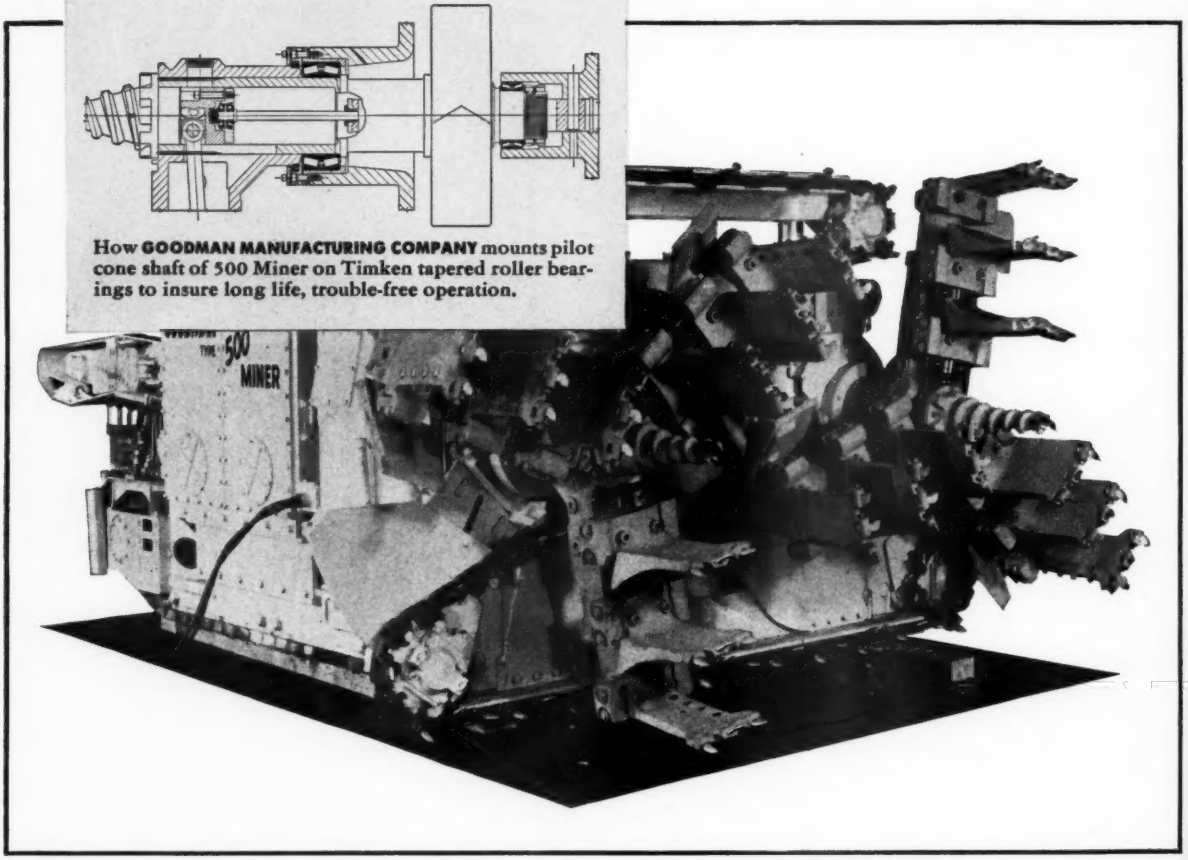
Heavy shock loads set up by high speed cutting are handled easily by Timken bearings. Rollers and races are case-hardened to give them tough, shock-resistant cores and hard, wear-resistant surfaces. And line contact between rollers and races gives Timken bearings extra load-carrying capacity.

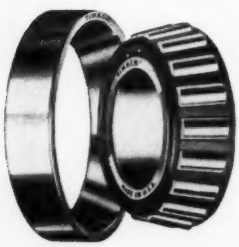
Particularly important for mining machines, working under a constant stream of coal, are effective closures. Timken bearings help make closures more effective by holding housings and shafts concentric. Lubricant stays in, dirt and coal dust out.

In no other bearing can you get the combination of advantages which Timken bearings give you. Specify Timken bearings in the equipment you build or buy. Look for the trademark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

How **GOODMAN MANUFACTURING COMPANY** mounts pilot cone shaft of 500 Miner on Timken tapered roller bearings to insure long life, trouble-free operation.

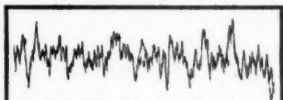




TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



PROFILOGRAPH TRACE. GOOD COMMERCIALLY GROUND FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)

PROFILOGRAPH TRACE. TIMKEN BEARING FINISH (5,000 X VERTICAL, 30 X HORIZONTAL)

OPTICAL FLAT. PERFECT FINISH

SMOOTH TO MILLIONTHS OF AN INCH

Surface finish of high quality Timken bearing rollers and races is so smooth that it takes a profilograph to measure its smoothness. This instrument measures surface variations to a millionth of an inch, as shown at the left.

NOT JUST A BALL — NOT JUST A ROLLER — THE TIMKEN TAPERED ROLLER — BEARING TAKES RADIAL AND THRUST — LOADS OR ANY COMBINATION

"They saved us more than they cost us!"

That's what Pond Creek Mine says about O-B Automatic Couplers

During a power failure in a section of Pond Creek mine, a trip of seven loaded cars (6 tons each) and a 15-ton locomotive rolled 600 feet down a 3½ per cent grade and crashed into an identical trip of stationary cars.

Despite the force of the impact, only two cars required extensive repairs in the mine shop.

"In this one accident alone," says T. B. Bandy, Superintendent of Pond Creek Mine, "the rubber draft gear on our O-B Automatic Couplers saved us more than their original cost!"

Veteran miners at Pond Creek have seen how this rugged O-B Coupler cushions 50-ton coupling impacts, how it forces skewed cars into alignment on the track, how its self-centering head and 30 per cent wider gathering range eliminates trip riders and the hazards of stepping between cars.

Their continuing preference for the O-B Automatic coupler is a matter of record — a record of safety, production, and low maintenance.

Write today for more information about the coupler that SAVES you more than it COSTS you.

Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

4585-M

Feeder and Trolley Materials • Control Materials • Trolley Shoes • Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers

Unloader Operation Is Controlled By One Man

The giant coal barge unloader handles J&L's Aliquippa Works normal daily requirements of 10,500 tons of coal.

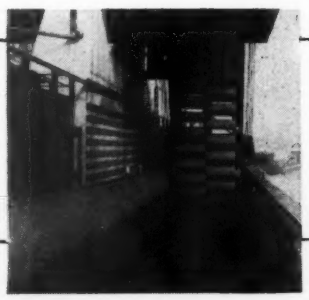
As the loaded barge is moved slowly under the unloader, coal is hoisted by a continuous elevator comprised of two lines of 7′ wide, ½ ton capacity buckets. These buckets carry the coal to a hopper at top of the unloader, from which it is conveyed by a 60″ wide belt to the surge bins.

The unloader removes the coal so completely that clean-up is not needed in the barge at any time.

When being unloaded the coal barge is protected from drifting by snubbing lines and barge positioners. The independent movement of the positioners enables the operator to keep the barge in precisely the right position at all times. The positioners are also used to push the barge away from the dock after unloading.

All movements of the barge and bucket elevator unloader are finger-tip controlled by one man. This man, located in a glass enclosed cab, has clear vision of all operations of barge movement and unloading.

Heyl & Patterson is now building a similar Coal Barge Unloader and Handling System of greater capacity for Jones & Laughlin Steel Corporation's Coal Preparation Plant at East Frederickstown, Pa.



Heyl & Patterson
INC.

55 FORT PITT BLVD. • PITTSBURGH 22, PA.
PHONE COurt 1-0750

Part way through the 705 foot rock section on the New Jersey side.

THEY'RE AVERAGING 630-FEET PER ROD

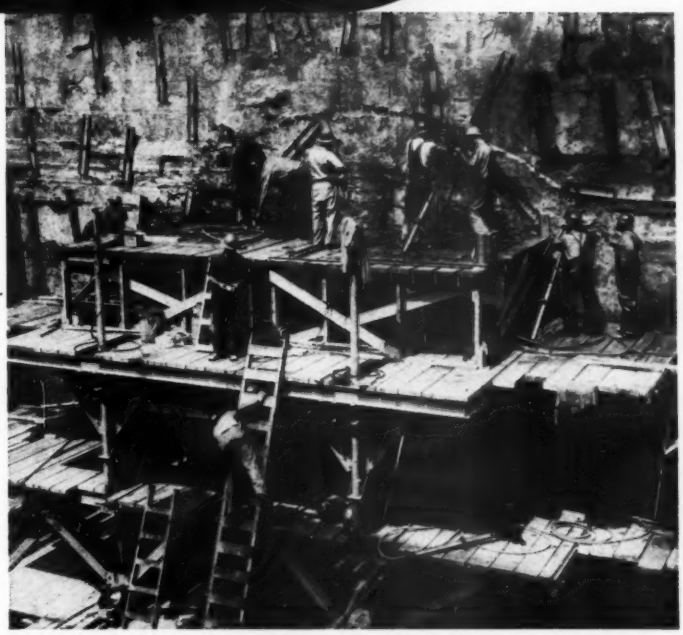
with

CRUCIBLE alloy hollow drill steel...

When completed the third tube of the Lincoln Tunnel will speed vehicular traffic between New York and New Jersey under the Hudson River.

On the New Jersey side construction involves tunneling through 705 feet of rock, and moving 24,000 cubic yards of trap-rock and sandstone. For this big job the contractors, Mason Johnson MacLean, chose Crucible CA Double Diamond alloy hollow drill rods. It proved to be an excellent choice, for in drilling 108,500 feet of hole, Crucible alloy drill rods gave an average of *630-feet per rod*.

There's good reason for this *extra* performance. For Crucible alloy hollow drill rods are made to *tool steel standards*, by the nation's leading producer of tool and other special purpose steels. You can count on longer rod life . . . fewer broken rods . . . *lowest cost per foot of hole drilled* . . . when you specify Crucible alloy hollow drill rods. *Crucible Steel Company of America, Henry W. Oliver Building, Pittsburgh 22, Pa.*



Drilling starts on the third tube of the Lincoln Tunnel.

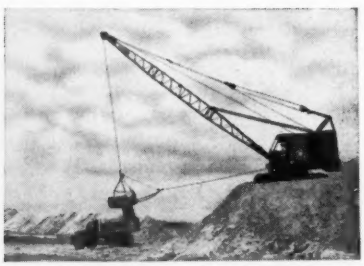
CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

ONE OF MANY NEW CRAWLER AND RUBBER-TIRED MODELS introduced by Link-Belt Speeder this past year. It's the full 1-yard capacity LS-98 — the most advanced design in modern shovel-cranes. New Link-Belt Speeder features allow owners to boost output, cut costs and increase their profit margins.

UP TO 25% MORE OUTPUT — Speed-o-Matic power hydraulic controls cut fatigue. No lag, jerk or strain.

AHEAD ON ½-YARD JOBS — It's the new LS-58, fastest, most powerful rig in its class, with "big-rig" features.



UP TO 99 NET HP FOR 1-YARD PROFITS — New heavy-duty LS-98. First time Speed-o-Matic in this class.

How to be AHEAD on every job

... use a Link-Belt Speeder! It's years ahead of the shovel-crane industry

TEAM up with the shovel-crane line that gives you the most productive capacity. It's the only line that offers you true power hydraulic Speed-o-Matic control, *and it's on every model.* Choose from many new models—with pace-setting improvements—in the ½ to 3-yard, 10 to 60-ton range. Equip for extra speed, power and work range—to bid successfully on more jobs—*and earn more on all of them.* See your Link-Belt Speeder distributor for complete facts, or write: Link-Belt Speeder Corporation, Cedar Rapids, Iowa.

LINK-BELT SPEEDER 13,774

Builders of a complete line of crawler and rubber-tired shovel cranes

[*Page 20*]

COST-CUTTING MEMOS:

USE THE RIGHT EXPLOSIVES: Don't buy certain grades or types of explosives from force of habit! Possibly you can replace gelatins and semi-gelatins with equivalent-strength, and more economical, ammonium nitrate dynamites. Coal mines operating on short schedules should check economy of improved permissibles. Stripping and open pit operations may find greatest savings in cored ammonium nitrate explosives.

USE THE RIGHT TYPE CARTRIDGE: Fluted ends on cartridges (as with Apex® above) make for easier loading of both horizontal and vertical holes with no significant loss of compaction. Spiral winding protects against cartridge rupture. Loading crews are not held up by stuck cartridges. In underground operations, Redi-Slit® cartridges mean quicker and easier loading. The right type cartridge will cut costs.

SELECT THE PROPER POINT OF INITIATION: There is much misinformation and superstition on this subject. However, many open pit operations are effecting important savings by initiating blasts at the point of maximum confinement—normally the bottom of each hole. Not only is explosives efficiency increased, but excessive air blast is avoided . . . as well as complaints and damage claims.

KEEP UP WITH THE LATEST TECHNIQUES: Blasting is continually being improved. See that your men are using the methods which work best in your particular operation. The men above are looking at "The Inside Story"—an Atlas technical movie—during their lunch hour. If you'd like to show this movie to your men, simply write us on your company letterhead. We'll arrange a showing for you at an early date.

YES, you *can* cut costs with better blasting. Better blasting is simply a combination of the right explosives plus the right methods . . . for your job. Talk with your Atlas representative. Let him examine your blasting problems. He may have some ideas which can mean real savings in your particular operation.

And send us the names of the men you'd like to receive "Better Blasting." This free, informative periodical is published quarterly by Atlas to bring you technical tips and product announcements.

ATLAS

ATLAS EXPLOSIVES

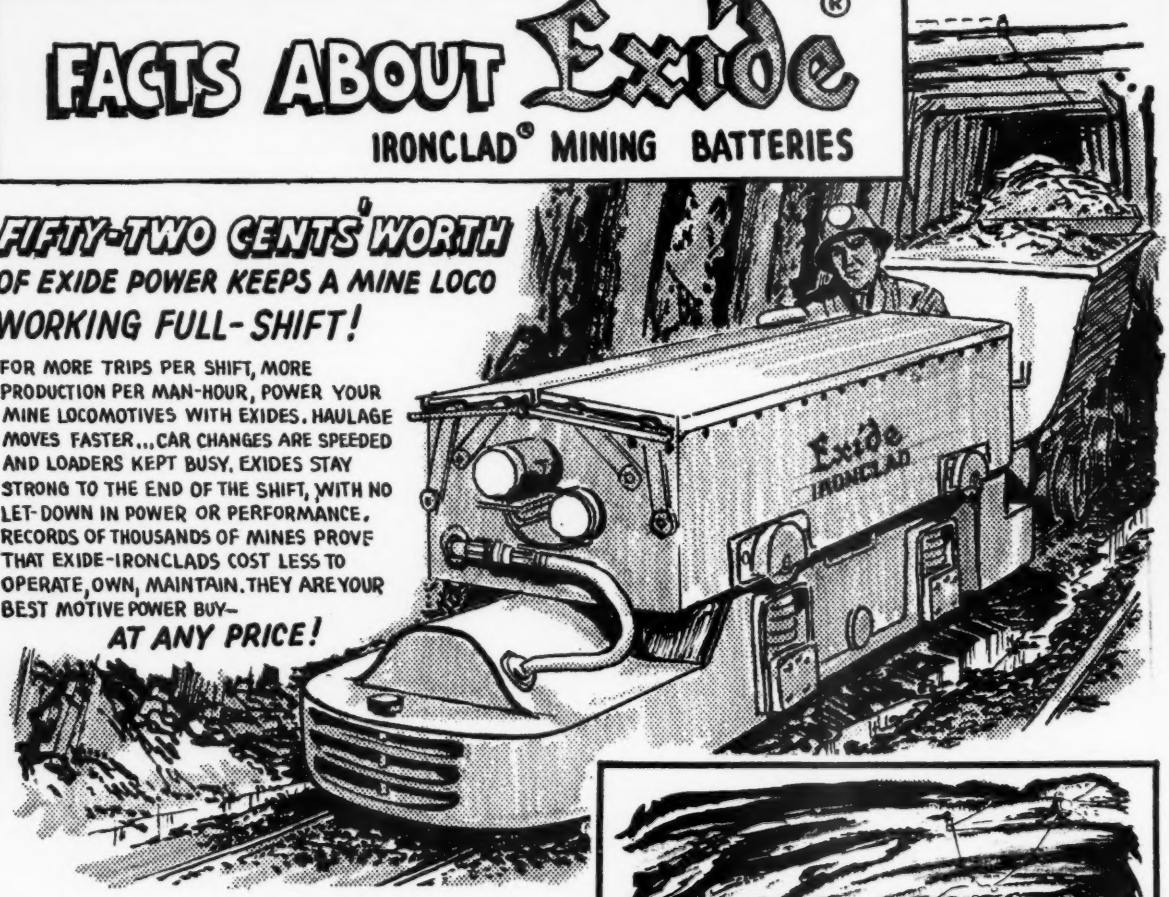
"Everything for Blasting"

ATLAS POWDER COMPANY,
WILMINGTON 99, DELAWARE

Offices in Principal Cities

FACTS ABOUT Exide®

IRONCLAD® MINING BATTERIES

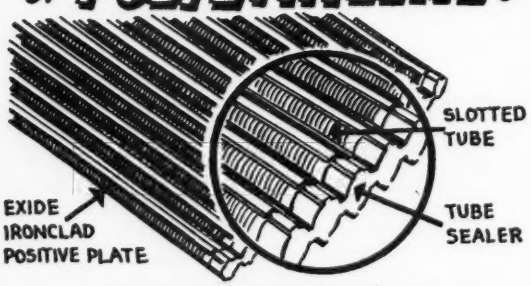


FIFTY-TWO CENTS' WORTH OF EXIDE POWER KEEPS A MINE LOCO WORKING FULL-SHIFT!

FOR MORE TRIPS PER SHIFT, MORE PRODUCTION PER MAN-HOUR, POWER YOUR MINE LOCOMOTIVES WITH EXIDES. HAULAGE MOVES FASTER... CAR CHANGES ARE SPEEDED AND LOADERS KEPT BUSY. EXIDES STAY STRONG TO THE END OF THE SHIFT, WITH NO LET-DOWN IN POWER OR PERFORMANCE. RECORDS OF THOUSANDS OF MINES PROVE THAT EXIDE-IRONCLADS COST LESS TO OPERATE, OWN, MAINTAIN. THEY ARE YOUR BEST MOTIVE POWER BUY—

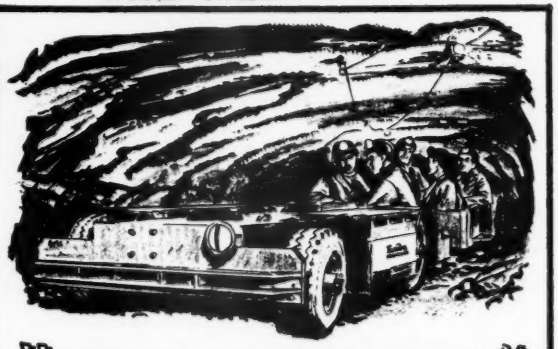
AT ANY PRICE!

MAGIC POWER TUBES OF POLYETHYLENE!



NOW, ACID-PROOF, NON-CORRODING POLYETHYLENE PLASTIC TUBES AND SEALERS ARE INSIDE ALL EXIDE-IRONCLADS! DEVELOPED IN THE LABORATORY, TESTED IN THE FIELD, AND ALREADY PROVED IN CUSTOMER USE—THIS MIRACLE BATTERY MATERIAL IS THE LATEST IMPROVEMENT IN EXIDE-IRONCLADS. ITS USE GIVES YOU MORE POWER IN THE SAME SPACE! LONGER BATTERY LIFE! BETTER PERFORMANCE! LESS MAINTENANCE!

FOR THE AMAZING "INSIDE STORY" ON NEW EXIDE-IRONCLADS WITH POLYETHYLENE, CALL YOUR EXIDE SALES ENGINEER!



"UNDERGROUND TAXI"

CUTS COSTS, BOOSTS PRODUCTION WITH EXIDE-IRONCLAD POWER!

THIS EXIDE-POWERED TRACTOR-TRAILER SPEEDS WORK CREWS, SUPPLIES AND EQUIPMENT TO PRODUCTION AREAS IN HALF THE TIME OF OTHER METHODS—WITH SAFETY, AND AT LOWEST COST. TO CUT PORTAL-TO-PORTAL TRAVEL TIME OR BOOST PRODUCTION, LET EXIDES HELP YOU. YOU'LL DO IT FASTER, BETTER, CHEAPER!

LET EXIDE HELP SOLVE YOUR MINING BATTERY PROBLEMS. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 1982, A MANUAL ON MAINTAINING MOTIVE POWER BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

"It's easier on **'tender'** roofs!"

AIRDOX

NON-EXPLOSIVE MINING METHOD

Cuts Costs 5 Ways

- Produces less fines in face preparation
- Rolls coal forward for faster, easier loading.
- Easier on "tender" roofs—cuts shoring, bolting
- Lowers cleaning costs by minimizing fines
- Reduces degradation—no shattered coal

Airdox reduces roof problems–it leaves a "tender" roof in a firm condition. The powerful, yet gentle Airdox "push" is directed down and outward. There is no shattering upward shock to loosen a "tender" roof. Timbering and bolting costs are reduced and the working face is left safe and sound.

This is one of the several reasons why Airdox is the most economical method known for face preparation. It will reduce your costs in the mine and in the tipple. Write for a free survey and we will demonstrate how your mine can profit with Airdox.

CARDOX CORPORATION • **BELL BUILDING** • **CHICAGO 1, ILLINOIS**

WAREHOUSES

Harper, West Virginia
Phone: Beckley 4812

Benton, Illinois
Phone: Benton 8-3821

St. Clairsville, Ohio
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Pikeville, Kentucky
Route 2, Box 99
Phone: Robinson Creek 5

Louisville, Colorado
Phone: Boulder
Hillcrest 2-7298

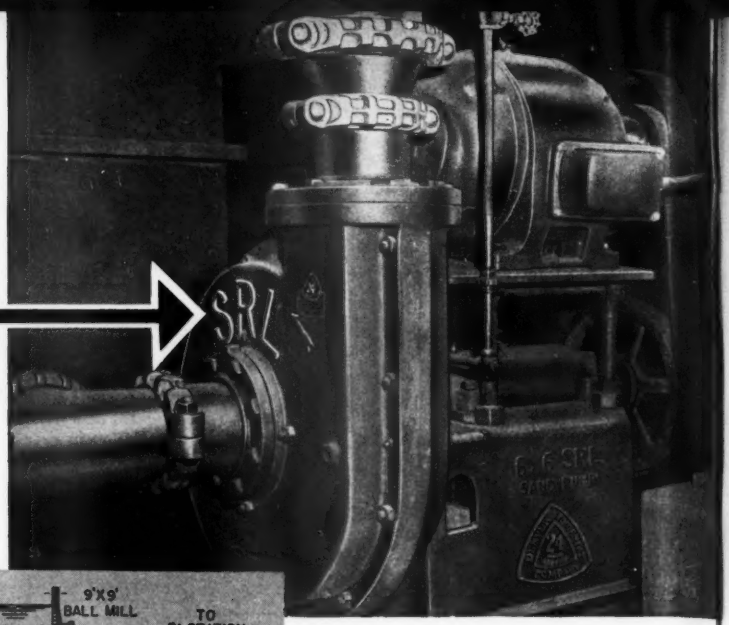
Library, Pennsylvania
Box 427
Phone: Library Colonial 3-6910

Camden-on-Gauley, W. Va.
Phone:
Camden-on-Gauley 2181

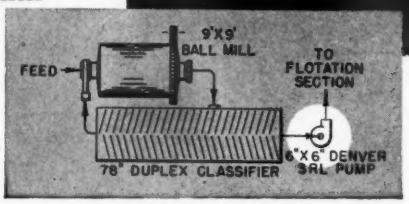
Evansville, Indiana
307 Northwest Fifth St.
Phone: Evansville 2-8944

Ottumwa, Iowa
Phone: Ottumwa
Murray 4-6564

DENVER SRL PUMPS AT Climax



Here's why Climax Molybdenum Company has 44 Denver SRL Sand Pumps in it's modern, efficient mill



A 6"x6" Denver SRL Sand Pump operating at 690 r.p.m., handling 2200 tons per 24 hours of —28 mesh classifier overflow material at 45% solids. Life of pump runner and casing liner was 593,000 tons.

BACKGROUND

Originally, a 2"x2" Denver SRL (Rubber Lined) Sand Pump was installed on a trial basis at Climax to handle coarse, abrasive —28 mesh deslimed pyrite flotation concentrates. Later, Climax purchased one 6"x6" Denver SRL Pump to handle the problem described with the photo above.

RESULT

Operation of these original Denver SRL pumps was so successful that, as a direct result, 42 additional Denver SRL Sand Pumps have been installed in this outstanding mill. These new pumps vary in size from the 2"x2" SRL (Open Runner) to the 8"x6" SRL-C (Closed Runner).

REASON

The Climax operators have found the efficient, trouble-free operation of Denver SRL Pumps entirely satisfactory. Life of wearing parts is long and shut-down time minimized. Horsepower requirements have been low and high efficiencies have resulted. Obviously, the Denver SRL is a big success at Climax.

HOW DENVER SRL PUMPS CAN REDUCE YOUR PUMPING COSTS

Send full data to us today regarding your particular pumping problem. Experienced DECO engineers will evaluate your problem and will return correct and workable recommendations immediately. This will obligate you in no way.

We carry replacement parts for all sizes of Denver SRL Sand Pumps in our Denver stocks. This enables us to give you prompt service whenever you may need it.

WRITE FOR FREE BULLETIN

DECO FLOTATION ENGINEERS — DENVER EQUIPMENT 24 HOUR SERVICE COMPANY

"The firm that makes its friends happier, healthier and wealthier"

DENVER, NEW YORK, CHICAGO, EL PASO, SALT LAKE CITY, VANCOUVER, TORONTO, MEXICO, D.F., LONDON, JOHANNESBURG

DENVER EQUIPMENT CO., 1400 Seventeenth St., Denver 17, Colorado

★ Mining ★
CONGRESS JOURNAL
Published for the Entire Mining Industry
by the AMERICAN MINING CONGRESS
ROBERT W. VAN EVERA, Editor

Federal Tax Policy

IN a 930-page report 78 businessmen, lawyers, accountants and University professors submitted to the Joint Congressional Economic Committee their suggestions on "Federal Tax Policy for Economic Growth and Stability." Oral hearings were held this month before a subcommittee headed by Rep. Wilbur D. Mills, ranking member of the House Ways and Means Committee.

In a panel discussion dealing with the impact of federal taxation on natural resources development, Henry B. Fernald declared that, "To furnish incentive for trying to find, develop, and bring into production mineral properties, there must be the hope of finding a successful property whose profits, after taxes, will be adequate to cover the costs for it and the losses on unsuccessful ventures, and yield a net over-all gain, commensurate with the expenditures, effort, and risk involved." Fernald also warned that if material changes are made in depletion or other tax provisions we cannot reasonably assume that the extractive industries will continue at their present rate of output and employment.

By contrast Professor Horace M. Gray of the University of Illinois charged that the depletion allowance "diverts economic resources into domestic extractive industries when in the interest of conservation, reducing costs, and over-all economic efficiency, such resources might better be employed in expanding overseas production." He posed this question, "Why should our Government subsidize domestic producers to expand production of scarce and irreplaceable natural resources, thereby hastening their ultimate exhaustion, when these same natural resources can be had from overseas much cheaper and without subsidy by the normal processes of international trade?" His colleague, Professor Arnold C. Harberger of the University of Chicago, said that "In point of fact, there are good reasons to believe that the riskiness of mineral exploration has been exaggerated," and went on to say, "It is my conviction that our present tax treatment of mineral industries has no justification in a peacetime economy."

Another member of the academic world, Professor James R. Nelson of Amherst College, concludes that "extractive industries exhaust resources. Therefore, special tax stimuli inducing them to expand output are, in general, particularly undesirable on security grounds."

To condemn percentage depletion as being contrary to good conservation practices and undesirable on security grounds is pure nonsense. It would appear that percentage depletion is being criticized for successfully providing the incentive by which the mineral wealth has been produced to wage victorious wars and produce the commodities which enable this nation to boast the highest standard of living in the world.

Do we wish our country to be wholly dependent on foreign countries for our minerals, thus giving them power in peace or war to cut off or limit mineral supplies needed for our industrial and national life and our defense? The answer is obvious.

Percentage depletion, by its simplicity and fairness, permits substantial savings in administration to both Government and taxpayer; it avoids discrimination against smaller taxpayers and is a protection against the excessive taxation of capital. It is the simplest and best procedure yet devised for sustaining capital investment in an industry that is vital to our national welfare and security.

Incentive vs. Controls

RECENTLY Roger M. Blough, chairman of the U. S. Steel Corp., in an address entitled "The Right to Be Wrong," emphasized the great basic principles that undergird our American way of life. His theme was freedom to choose rightly or wrongly, which he described as "the mainspring from which all our traditional freedoms naturally and logically developed." There is no doubt that we are consciously aware of the importance of these freedoms, and yet the American people have in the past allowed encroachments on our liberties in many forms—among which are laws imposing production quotas, allocations, restrictions on how peaceful persons may spend their money and numerous other controls. The balance point between freedom of choice on the one hand as opposed to law and regulation on the other has never been clearly agreed upon.

Security and welfare laws set forth some measure of control over such matters as "housing, retirement, savings, jobs, working conditions, insurance, buying and selling, borrowing and lending, farming, manufacturing, investing, education, medical care, wages, and a host of others"—as stated by Blough. While many of the stated objectives of these laws are meritorious, we are convinced that over the past 20 years we have seen the scales tip beyond the balance point—to the detriment of our freedom of choice.

In times of national emergency the stimulus of war or disaster has been adequate incentive to overcome the stifling effect of loss of freedom. But in the more normal times of the present, what incentive to produce for a better world has the man whose welfare is provided by Government? We agree with the need for protection of the more vital aspects of our fellowmen's welfare in the rigors of a competitive society, but many beneficiaries under present laws have sold away their freedom of choice and, what is worse, their natural incentive to produce, to plan or to imagine for the benefit of posterity.

Blough observed that "the 'you-provide-my-welfare trend' in our history appears to be slowing to a walk." He gives credit for this encouraging trend to the religious, educational, and business leaders of America. We feel that some leaders in our Government have helped to sponsor this "desire to return to responsibility," and that it would behoove all our lawmakers to be cognizant of it.

Jumbos have been adapted to drill bulk of the Tri-State district's production (left), while the Airleg works to good advantage in confined areas (right)

Airlegs Versus Jumbos on Production

Prolonged Testing Program Proves Practicability of Newer Equipment and Insures That Proper Tools Are Used for Each Job

By S. S. CLARKE
Retiring Superintendent
Tri-State Mines
Eagle-Picher Company

ABOUT three years ago the airlegs were introduced in the Tri-State field. Some engineers had the idea that the airlegs would supersede the conventional drifters—then in universal use throughout the district. Others didn't subscribe to that idea but thought that the airleg could be used to definite advantage.

Several airlegs of competitive makes were purchased and assigned to different mines to be tried out on work where it was believed they would be an improvement over the larger drifter, owing to their ease in moving and setting up. They offered possibilities as an ideal tramp drill for drilling bright spots or indicative formations, driving raise, widening old drifts for truck haulage and possibly mining some of the low head room upper mineralized beds that were inaccessible or uneconomical to install jumbos.

Miner Acceptance

We found that the younger men with not much previous experience learned the tricks of handling airlegs with a minimum of physical effort. The older miners were somewhat doubtful as to its efficiency and had a tendency to fight the machine. This resulted in early fatigue, thus older men gave an unfavorable opinion of the drill.

In building truck roads through old mines, airlegs were highly adaptable for shooting out bulges on pillars, popping high bottom and widening old drifts, drilling slab rounds in the wall and flat holing the roof. In this type of work, one man could drill nine to 12 ten-ft holes per shift.

High Mast Jumbo in Raise

A seven-ft by seven-ft raise 40 ft high has been completed recently at the Webber Mine. A high mast jumbo collared the raise as the roof was about 30 ft above the floor and it proved a very safe and satisfactory way to start a raise under those conditions.

Two men drilled from 13 to 15 ten-ft holes, loaded and shot them in a shift, using a 2⅝-in. airleg, ⅞-in. hexagon drill steel and 1¾-in. carbide insert bits.

In ground from 12 to 18 ft high, test holes or breast rounds can be readily drilled by backing a truck up to the face and setting the airleg on the truck bed.

Some tests were made using Integral steel with carbide inserted in a chisel or bull bit. The cutting

Advantages of Airleg Drill

Light Weight
Low Air Consumption
Light Weight Drill Steel
Isolated or Temporary Location
Ease of Setting Up
Faster Drilling Speed
Less Capital Invested
Drill Repairs Less Per Shift

Disadvantages

More Holes Necessary for a Given Task
Less Tons Broken Per Ft Drilled
Increased Powder Costs
Higher Direct Labor Costs Per Ton Broken or Ft Drilled

speed was good in uniform formation but caused trouble in broken ground. Also, any steel breakage was an additional expense. It was finally decided that detachable insert bits and progressive steel lengths were more economical and efficient.

In roof bolting operations, the airleg is ideal. When mounted on a truck, it is very mobile and can be fitted with a hammer head to drive the roof bolt.

The debit side of airleg operation is no doubt more than balanced when consideration is given to its advantages in special isolated applications. Heavy conventional equipment would necessarily have been used to accomplish these tasks. Airlegs have proven themselves very satisfactory in long hole prospecting. It is the policy of the Geological Department to spot prospect holes in walls and roof when indicative formation might develop a new run of ore.

Jumbo for Bulk of Production

In 1954 the total dry ore mined was 1,862,451 tons of which 59,844 or three percent was airleg production. Of the balance 1,802,607 tons or 97 percent was jumbo production with the exception of about 14,000 tons which were mined by a post or prod drill in a heading accessible only by a goat trail.

Capital investments in jumbo equipment are many times that of airlegs. Drill repairs are higher per drill shift but are about equal when reduced to a rock ton cost. Repairs on a jumbo due to ordinary wear and tear are practically nil. Cable replacements are the only repairs unless the jumbo has been damaged by a fall of ground.

Two sizes of crawler chassis are used. Both are air driven. One

Track mounted jumbo will climb this muck pile without difficulty

Conventional jumbo may be used in headings up to 20-ft high

Younger men learned airleg operation quickly

	JUMBO STATISTICS—1954			AIRLEG STATISTICS—1954		
	Poorest	Best	Average All Mines	Poorest	Best	Average All Mines
Drill Shifts	2,541	1,160	19,250	264	493	1,596
Tons Hoisted	147,758	241,616	1,802,607	10,047	20,313	59,844
Holes Drilled	14,085	5,485	120,427	2,980	3,487	11,894
Ft Drilled	146,231	72,131	1,241,046	18,964	23,940	100,416
Tons Per Drill Shift	58.0	208.0	93.6	38.0	41.2	37.5
Holes Drilled Per Drill Shift	5.5	4.7	6.2	11.3	7.0	7.5
Ft Drilled Per Drill Shift	57.5	62.2	64.5	71.8	48.6	62.9
Average Depth of Holes	10.4	13.2	10.3	6.3	6.8	8.4
Pieces of Steel Broken	604	343	6,122	24	157	275
Breaks Per Drill Shift	.24	.30	.32	.08	.32	.17
Ft Drilled Per Break	242.1	210.3	202.7	790.6	152.5	365.1
New Bit Cost Per Drill Shift	$3.25	$3.50	$3.19	$3.17	$1.23	$1.74
Total Bit Cost Per Ton	.058	.017	.034	.083	.030	.046
Total Bit Cost Per Ft	.059	.058	.041	.044	.026	.028
Tons Broken Per Ft Drilled	1.01	3.35	1.44	.55	.80	.59
Drill Labor—Per Ton	.248	.160	.261	.427	.391	.429
Drill Labor—Per Ft	.250	.534	.375	.224	.331	.256

Airlegs found good application in long hole prospecting and roof bolting

takes either a 12 or, 20-ft one piece or a 35-ft telescoping mast. The larger size takes a 65 to 70-ft telescoping mast. Both are well balanced and do not require hazardous outriggers and guy lines. The short masts or booms carry two drifters and in some instances three drifters have been manned by two drillers. On the high mast, only one drill is mounted, the helper staying below to raise and lower the mast or move the rig and also handle steel, explosives, etc.

Scaffolds Unsatisfactory

A jumbo can drill out ground up to 20 ft in height, which formerly required a heading and a stope or bench. In higher ground it is generally the policy to shoot slab rounds in the lower half of the face then climb the muck pile to drill the upper part.

In some instances, low grade mineralized beds lie just above some of the previously mined richer lower beds. The 65 to 70-ft jumbo is so far the best rig devised for taking down roof. Before the advent of the jumbos, attempts were made to mine some of the upper beds by means of long posts or wooden scaffolds, but both were expensive, dangerous and very inefficient.

The crawler-type has been accepted as our standard owing to its better traction in climbing muck piles or going over rough bottom. One rubber-tired jumbo was built but was soon discarded as it did not have sufficient traction to climb a small muck pile

(Continued on page 79)

Reminiscence

Pocahontas No. 1 Retires*

The Pocahontas No. 1 mine, opened in 1882, unlocked one of the richest coal fields in the world

First Coal Mine in the Pocahontas Field Finishes 73 Years of Continuous Production With a Total Output of Over 44,000,000 Tons

FROM a hole in the hill back of his blacksmith shop Jordan Nelson sold coal at a penny a bushel and the mountain men toted it home on mule-back.

One day a customer struggled up the trail leading an ox wagon. As he moved away with a full load, Aunt Betsy Thompson, a neighbor, put her foot down.

"This must be stopped," she declared. "The coal will run out. There won't be enough for us here in the hollow."

Aunt Betsy Thompson was wrong.

That was about 1870. When Jordan Nelson's coal mine "retired" in October, over 44,000,000 tons of the richest coal anywhere had been mined from drift mouths in the Pocahontas No. 3 coal seam within a mile of its original opening.

Forty-four million tons! Loaded in 50-ton hopper cars it would fill a train almost exactly 5750 miles long. That train's 880,000 cars would stretch air-line from Norfolk to Los Angeles, up the coast to Seattle and almost all the way back to Norfolk again in a great transcontinental triangle.

Jordan Nelson's forge feeder today is the Original Pocahontas mine of the Pocahontas Fuel Co. Inc., of Pocahontas, Va.—granddaddy of all the mines in the wide field which bears its name.

And that hole in the hill is a direct cause of the Norfolk and Western Railway's western expansion, the building of a branch up New River which was to become the main line to Ohio.

There is nostalgia but little sadness at the closing of Pocahontas Number One. Men and machinery have been moved gradually to Boissevain, three miles up Laurel Creek. The pleasant town of Pocahontas will be a quieter place with the tipple closed and the refuse mountain inactive. But Pocahontas Number One will be remembered for a long, long time. Besides being the beginning of the entire coal field it has been an extraordinary mine in many ways. The Pocahontas No. 3 seam averages 9.18 ft in height. It reaches 18 ft in some places and has actually been measured at 23 ft in "swags," or dips in the seam.

It is low-volatile, smokeless coal equally suitable for household use and for by-product, steam and many other purposes. N. & W. coal cars have started it on journeys literally almost all over the world.

Knew of Coal in Colonial Times

Knowledge that there was coal in southern West Virginia and southwestern Virginia extended perhaps to colonial times. Thomas Jefferson wrote of it in general terms and Professor W. B. Rogers reported it in his geological researches between 1836 and 1842. The region was sparsely settled and there is reason to believe that the mountaineers living right on top of the coal never thought to use it for themselves.

Probably the first coal actually burned in the whole rough territory came from that hole which later belonged to Jordan Nelson. Some say that he discovered that it would burn in his blacksmith shop. But others said that Jordan arrived, rather hurriedly, from Boone County about 1867 and found a man named Andrew Stowers operating the little shop just down the river from the present town of Pocahontas. Nelson swapped his Boone farm for Stowers' land. Shortly before his death in 1922, at the age of 94, he told a newspaper reporter he bought an additional 300 acres for an old mule and a muzzle-loading shotgun.

* Article and illustrations courtesy of the Norfolk and Western Magazine.

Old Timer Burl B. Maxie points to all that is left of Jordan Nelson's original 13-ft opening on a hillside half a mile below Pocahontas. Maxie, who worked in the mine 50 years without an injury, remembers coming to the mine as a boy. Other man is Roy Hanshaw, a coal miner

It matters little whether or not Nelson actually discovered the coal, he undoubtedly was the first man in all the countryside to find that the coal would burn without forced draft. Previously it had been used only in forge operations but Nelson built an iron grate and demonstrated that it was a better fuel than wood for general heating and cooking purposes.

In 1870 a well-known geologist, J. B. Lesley, visited Abbs Valley, the site of Nelson's "mine," and reported the coal to the owners of the Shenandoah Valley Railroad. In 1873 Captain Isaiah A. Welch began an exploration of what was beginning to be called the Flat Top Coal Field, principally to evaluate timber resources. He reached Jordan Nelson's place and was amazed to see that he "had outcropped a bed of coal for use in his shop which when fully driven under cover showed a thickness of thirteen feet between bed and floor rock." He then followed the vein and discovered the vast extent of what is now called Pocahontas Seam Number Three.

Captain Welch in 1895 wrote a newspaper account of his early trip. He said that the coal was of so little use to the inhabitants that few possessed shovels. As he had been looking for lumber, he had none. "The prospecting had to be done with a narrow hoe used by the natives for digging ginseng, then the most important industry in the entire section," he wrote.

A Railroad Becomes Interested

These and other reports were read avidly by Frederick W. Kimball, president of the Shenandoah Valley Railroad, which in 1881 was building down the Shenandoah Valley toward the new town of Roanoke, Va.

Events happened quickly those first few months in 1881. In February C. H. Clark and associates of Philadelphia (who controlled the Shenandoah Valley Railroad) bought the Atlantic, Mississippi and Ohio Railroad at public auction and reorganized it as the Norfolk and Western Railroad. Mr. Kimball became vice-president of the N. & W. In March he employed two experts to look over coal lands for future railroad fuel supply and to take mineral options. In May he rode horseback through the rough country and visited Jordan Nelson's 13-ft coal mine. He was impressed and his description impressed other officers of the railroad.

The Southwest Virginia Improvement Co., original predecessor of the Pocahontas Fuel Co., held its organization meeting at New River Depot, Va., on September 3, 1881, with the Clark group as large investors. The railroad agreed to have a line to the Nelson mine completed in two years.

The fuel company purchased land from Nelson and others and made its first opening about half a mile up the creek from the blacksmith shop.

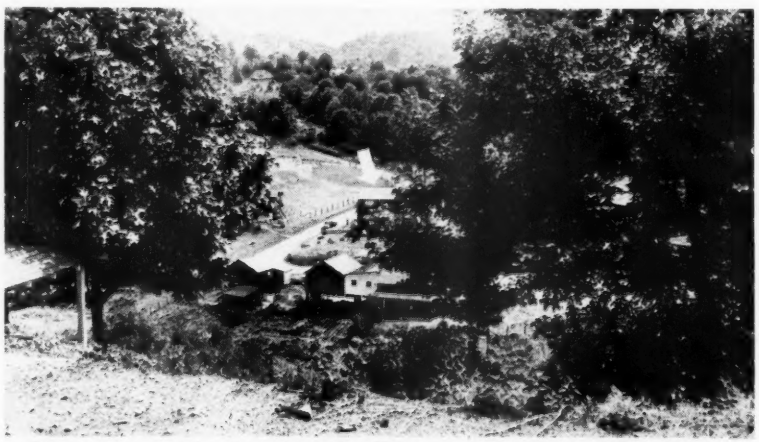
Powell's Bottom—the first name for the town of Pocahontas—was a dense laurel thicket in a narrow valley in the middle of nowhere. The closest shipping point on the N. & W. was at Wytheville, almost 60 miles away. Those 60 miles were solid wilderness, featured by two major mountains and a wide assortment of pesky hills. But the work began at once with tools, men and machinery traveling by mule power through the western Virginia autumn.

First Superintendent

The first mine superintendent was 27-year-old William A. Lathrop, a Philadelphian who tackled the assignment with a college degree and only brief practical experience. With him came his 24-year-old bride, Harriet, who had spent her life in New York City and who had never ridden a horse. Mrs. Lathrop's account of the early days, written at the request of her children when she was 80, is a colorful, exciting account of the first days of Pocahontas.

The young couple stepped from the New York train into the dismal rain at Dublin, Va., on November 22, 1881 and started out next morning over a rutty, soggy trail in a buggy. An 11-hour drive brought them to Pearisburg (20 miles by winding Route 100 today) where they began meeting unreconstructed Confederates, mountain cooking and a strange new dialect. The next day the rain changed to driving snow but the pair managed to reach an inn in the hamlet of Princeton, W. Va., (there was no Bluefield in 1881). And a full day's drive brought them to their destination, Squire Moore's house in Abbs Valley where they were to stay until their household goods arrived. It took almost three months to get the furniture carted from Dublin.

Checks meant nothing to the mountain people, so getting the monthly cash payroll from the railroad always



This picture was taken from the Jordan Nelson opening. The house indicated by arrow is on the site of Nelson's blacksmith shop. The state line crosses the picture diagonally. The "Mine" was in West Virginia, the blacksmith shop in Virginia

presented a problem, particularly as the number of hangers-on around the booming village of Pocahontas continued to grow. One day Lathrop received a letter from a storekeeper in Jeffersonville (Tazewell, Va.) enclosing a postal card he had found on the floor. "No telling who has seen it," he wrote. The card, from the express agent in Saltville, read: "We have $20,000 in cash for your company. Package too large to go in safe, what shall we do with it?" Lathrop played it smart. Instead of going southwest to Saltville he took two armed men and rode southeast to Wytheville, wiring from there for the money. Then they returned practically nonstop to the mine, arriving at three in the morning.

First Production in 1882

The original opening made by the Southwest Virginia Improvement Co. was a slope called the East Mine. The entry is still there, on the opposite side of Coal Branch from the tipple, and until recently coal was taken from it. Mining operations actually began in 1882 as the railroad was expected that December. The laurel thickets disappeared as one house after another arose in the valley. On June 30, 1882, the town was official: a post office called "Pocahontas" was established.

That brings the question: Was the coal seam named after the town or were the name of the town and later the coal field derived from the name "Pocahontas" given to Jordan Nelson's No. 3 seam? It may never be known for sure how an Indian princess of 275 years before and 240 miles due east became associated with a coal field. It seems probable now that the town came first, that the romantic young ladies in the mining camp—Mrs. Lathrop, Mrs. Kimball and the rest—were given the honor of naming the post-office-to-be, and that they picked a beautiful and romantic name Pocahontas.

Pocahontas, Va., or Powell's Bottom as it was once called, as it looks today. Main office of the Pocahontas Fuel Co. is surrounded by trees in left center

By March 1883, there were some 50 houses in the town, 100 coke ovens built and a pile of 40,000 tons of coal on the ground. Lots of us have waited for trains but probably nobody along the N. & W. ever wanted a train as badly as those people did.

Mrs. Lathrop described it:

"I was just plain excited the day it did arrive and could hardly settle down to do anything intelligently; finally we heard the locomotive whistle down the line, and I assure you no operatic music ever thrilled me as that sound did, and the freight train with a dilapidated looking passenger car on the rear end was a beautiful sight. Everyone turned out to see and welcome it, with cheers and shoutings . . ."

A Sales Job

It is history that the first car was loaded for company fuel and that the second car, decorated with bunting, was consigned as a gift to the mayor of Norfolk on March 12, 1883. The coal was distributed to the people in Norfolk but most of them left it lying in the streets. What little coal they had seen before had been anthracite; they were disdainful of this home-mined product.

The company had some difficulty at first selling its coal for home use. But it thrived from the beginning through business with railroad and steamship companies. Among its first big contracts was one with the Boston & Maine Railroad to deliver 50,000 tons in Boston at $4.83 per ton.

There were other troubles. The railroad was washed out for three weeks shortly after it opened. There was a labor shortage. Then a year from the loading of that first car, shortly after midnight on March 13, 1884, a tremendous explosion and fire all but destroyed the East Mine. But Pocahontas survived—both the mine and town—to become known as one of the safest operations and pleasantest coal villages in the whole area.

That first year—1883—Old Pocahontas shipped 103,618 net tons of coal. By 1888 tonnage had grown to a truly phenomenal 948,692 tons—the highest yearly tonnage the mine ever produced.

The Pocahontas No. 3 seam averaged 9.18 ft high the mine over. It reached 18 ft in some areas and has been measured at 23 ft in swags

Historical Tidbits

The town was bursting at the seams. Workers thronged in by the hundreds including a large group of Hungarians who brought Old World custom and dress to the mountain country. Descriptions by the old-timers make it appear that Pocahontas for a time was a fair-sized replica of a wild western frontier town. At one time it was said there were 65 "blind tigers"—the "speak-easies" of a later day—operating openly. Gunfire in the streets was mixed with the braying of scores of mine mules tethered beside the creek.

But the boom settled down to steady business, a police force went into operation to enforce ordinances and Pocahontas became a peaceful, lawabiding community.

The mules, incidentally, were given a trip to the hills each Saturday afternoon for a week end of feeding and relaxation. Old heads tell of the animals heading happily and without human encouragement for pasturelands and returning under extreme pressure each Sunday night. "Just like all of us on week ends," they say.

There is a mountain of mine refuse outside Pocahontas now, a record of 73 years of mining which soon will slowly turn green like other mountains. Beneath it are the foundations of hundreds of coke ovens used in the days when coke for steel-making was a major product. Some of those ovens, however, were never used. The railroad in the early days allotted cars on the basis of coke ovens built.

There have been 16 superintendents of Number One since Mr. Lathrop, the last being W. F. Wyrick. The company has produced some 275,000,000 tons of coal in its history, a history which goes back to Jordan Nelson's hole in the hill.

Company Evolution

In 1901 the Southwest Virginia Improvement Co. became the Pocahontas Collieries Co. which merged in 1907 with the Pocahontas Consolidated Co. to become the Pocahontas Consolidated Collieries Co. Pocahontas Fuel Co. was established in 1910 as a selling agency. The mining and selling companies were merged in 1917 to form the present Pocahontas Fuel Co., Inc. It uses the trade name "Original Pocahontas."

D. P. Belcher, acting superintendent of Pocahontas Colliery, shows William A. Fullarton, special assistant to the president, Pocahontas Fuel Co., and M. R. Reedy, lamp attendant, the carved keystone over the entrance to the West Mine. Stone, which came from one of the original Pocahontas buildings, bears initials of the company officials at the time it was placed there in 1918. The West Mine entrance was driven in 1907 but the stone entrance was later built

Without missing a year in production since 1882, Pocahontas No. 1 produced 44,072,021 tons of coal through 1954—plus about 200,000 tons which is being mined this year. Few mines anywhere have surpassed that record, perhaps fewer have been mined that long continuously.

Visitors for many years to come will be able to see this amazing vein. Just off the highway west of the Pocahontas business section the Pocahontas Operators' Association maintains a lighted exhibition mine. It is possible to drive through this actual portion of the old Baby Mine or to walk through it in ten minutes. Its guest book shows entries from all over the world.

The towering refuse pile is useful now. Its top has been smoothed as an airstrip for a small company courier plane. The little Cub makes two circle trips daily between the coal Company's main offices at Pocahontas and mines at Amonate, Bishop and Itmann, cutting automobile time greatly. The airline distance to Itmann, for instance, is 22 miles; by road it is 50 miles.

The original Jordan Nelson opening has fallen in. It took Burl Maxie, who worked in Number One for 50 years without an injury, to find it for visitors the other day. Maxie, who is over 70, remembers going to the original mine with his father on a mule.

He and other old-timers recollect that all the mine entries bore colorful names, names which still appear on old engineering maps: "California," "Hell's Half Acre," "Wheel of Fortune," "Brooklyn," "Gibraltar," "Africa"—and all the rest.

At one time you could enter Pocahontas Number One and travel 10 miles underground. The main entry extended 17,000 ft into the mountain and 2880 coal acres were mined.

Some fine Pocahontas coal awaits a mine crew in front of the towering mountain of slate accumulated over 73 years of mining. The company's messenger plane takes off twice daily from atop the pile for round-robin trips to three other mines

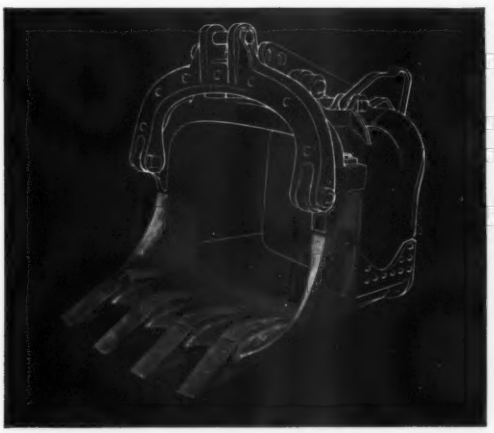
THIS AMSCO® LIP TAKES A SHARPER BITE

. . . chews out full loads at normal power

The lip juts way out where it easily bites up—and delivers—the full yardage of rock or earth. It's a sharp *extension* of the dipper, with fanned teeth—for fast, easy penetration. The dipper digs out a heavier load without strain on the shovel . . . even requires less power, and prolongs life of all parts.

This Amsco lip lasts a long, long time, because it's made of the toughest steel known—manganese steel—the metal that work-hardens to fight off wear by impact and abrasion. Lip replacement is simple, when necessary, keeping downtime short.

If getting more pay loads moved faster with less wear on equipment means more profits to you, *specify Amsco Renewable Lip Dippers.*



AMERICAN Brake Shoe COMPANY

AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Ill.

The mill at a South African gold mine

The Role of Gold in the Monetary Mechanism*

An Analysis of the Monetary Mechanism in Which Gold Pricing, Sound Standards of Value, the Equation of Gold to Paper Money, and Personal Liberty Are Discussed

By DR. J. E. HOLLOWAY
Ambassador to United States from
the Union of South Africa

WHENEVER the mechanism of money gets out of gear there follows a vast amount of discussion on the methods required to put it back into sound working order. Much of this discussion gives insufficient weight to two prime considerations.

The first is that money represents an invention like a railroad engine or a motor car that has undergone many improvements throughout the ages. When we want to restore it to working order we must rely on our knowledge of how it has been developed, what it can or cannot accomplish. It is a part of the vast world of invention which has made possible a highly complex and highly productive society. It is an essential part of the process of production.

The second consideration is that it is a mechanism, and that therefore if we want to find out in what respects it is not working efficiently we must examine the forces with which it operates. It is only by gauging these forces that we can avoid the confused argument which seems to be invariably associated with monetary disputations.

In the days of the Gold Standard certain freedoms applied to the possession of gold. These freedoms represented forces in the mechanism.

It is proposed therefore to focus attention here on the functioning of the monetary mechanism and to avoid the many side issues which usually bedevil all discussions on money. In so doing this article will deal with the forces in the mechanism, beginning with the price of gold as one of the most frequently forgotten forces.

* Adapted from an address by Dr. Holloway delivered at the University of California in Berkeley.

Fixed Gold Price

The view is held by many persons that the price of gold should never be changed.

There is clearly no sacrosanct figure to express the value of a given quantity of gold in terms of a given paper currency or money of account. When the meter was accepted as a measure of length it was related to the circumference of the earth so that its value could at all times be equated to something eternal. No such eternal equation can, however, be determined for gold because monetary value is itself a subjective and not an eternal concept and because a unit of currency is historically a notoriously unstable and most uneternal concept.

We are therefore inevitably driven back to the fact that there is some underlying assumption in the equation one oz of gold = $35. Because as we cannot equate the value of gold to something unchangeable, and as gold itself is elementally unchangeable, the factors which influence the equation of value can lie only in changes in the use of gold or in changes in the "purchasing" power of the currency to which a given quantity of gold is equated.

We Live in a Money Economy

While gold serves as money we can disregard its subsidiary uses. We are, therefore, driven back to one of the most difficult concepts of economic science, the function of money. Few people seem to be able to differentiate between the meaning of money in their own pockets and money as an essential mechanism of a free society. In itself, and as a purely scientific or philosophical concept, the latter is not at all difficult. But it demands an analysis, divested of side issues—like personal interest, credit organization or governmental manipulation—of the functions which money plays in giving human organization a more efficient use of its resources and in giving the individual a right to his own earnings and his own savings. In a purely scientific sense money is a measure of value, a medium of exchange and a store of value. These are essential functions for the maintenance of a free society and an advanced economy. Money must meet all the requirements under these three heads and the more efficiently it meets them the better it is as an instrument of production. If the monetary mechanism is also used for other purposes, like manipulation of economic relations or of foreign exchange such use may detract very materially from its main function as an essential part of the machinery of economic efficiency and as a safeguard of individual liberty. These are such high values for the maintenance of civilization that the application of the mechanism of money to any other purposes must be regarded by all civilized states as highly questionable.

We of this century are living in a money-economy. I shall try to demonstrate presently that we are trying to do this without money in any real sense of that term. Ages have passed between the comparatively recent introduction of this moneyless money-economy and the time when the invention of money in its most primitive form enabled our primordial ancestors to devote some of their energies to more efficient uses than was possible under a system where every individual scratched or hunted for his own food and shelter, or at best obtained these under a simple system of barter. Many embellishments were introduced in the meantime. If, however, we want to get back to the terms of our equation, we must divest our inquiry of these embellishments. Particularly must we beware of the imp of discord called "Credit" because the functions of credit, though very important, are not basic functions of money but a derivative from these functions.

Evolution from Barter

The advance from pure barter to a money-economy was an important step in the progress of mankind towards civilization. Under pure barter man gives something that he has for something that he requires for his own use. In a money economy he introduces a third factor into the exchange. This third factor is something that he can always exchange for something that he requires. In this way he saves a vast amount of time, which can then be devoted to further production. Once this process is started it can be repeated *ad infinitum*. It therefore lays the foundation for ultimate world trade and brings within man's reach enjoyments which he could not otherwise have.

In its embryonic form anything can serve as a medium of exchange. Even in our own age, in which a pure monetary economy has broken down

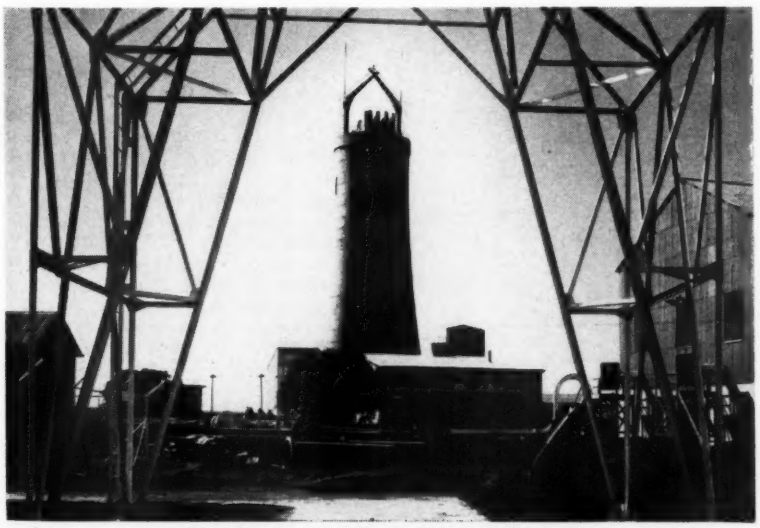
Dr. John E. Holloway

because we are trying to run a money-economy without money, such articles as cigarettes have temporarily been pressed into service as media of exchange.

As happens with all new discoveries, however, once Edison's one percent of inspiration has been infused into the mass, the 99 percent perspiration takes over and improvement becomes a normal process. The articles originally used as money were probably ordinary articles of utility like domestic animals, arrowheads and hoes. As mankind learned more about money as a tool of production he learned how to streamline the monetary mechanism, to distinguish between essentials and accidentials, to shear it of appurtenances which militated against more effective functioning. Animals did not fit into this classification because they had to be fed and had a habit of dying at inconvenient times. Hoes rusted. Copper was too heavy to transport. Precious stones were not readily divisible. Silk perished. And so in course of time the precious metals took the lead and in the 19th Century gold surpassed silver in the foremost trading countries. In respect of durability, divisibility, recognizability, universal acceptability, etc., gold established itself as superior to its rivals as the most perfect monetary material.

Changing the Price of Gold

As long as mankind remembered that sound money is fundamental to efficient production and is an essential framework for distributive justice, it persevered in the task of creating a sound money, with the accent on the word "sound." Economists were aware of the fact that a perfect money could not be created: for money measures values and value is a subjective concept. To measure one moving object with another moving object requires nonexistent legerdemain. If, however, the moving object, which served as the measure, could be



New headframe at South African gold mine

held as fixed as possible, a reasonably accurate equation of the values which constitute the economic world could be attained. Hence the idea of a fixed and unchangeable price for gold. Hence also the difficulty which many people experience in accepting the idea that—in spite of the experience of history—the price of gold can be changed.

Stabilizing Forces

Remember that there is a great deal of human effort and of human happiness and of individual liberty involved in a change of the measure of value. For the invention by mankind of a reasonably stable medium of exchange has created the possibility of the division of labor, with all its attendant advantages, on a world-wide scale. It has made it possible to negotiate long-term contracts involving millions of wage earners or vast constructions without the necessity for such periodical renegotiation as is necessitated by changes in the meaning of the words in the contract which denote value. It has made it possible to hold assets created by human endeavor for long periods without the fear that they will depreciate or even disappear entirely through a change in the reservoir or store of value. The invention of money is one of the most fecund inventions of mankind and the invention of as stable a measure of value as is possible in a world of continuing instability marks the apex of human resourcefulness in this field. It is therefore understandable that many people are strongly opposed to a change in the price of gold. They regard the price once fixed as having something of a decalogual moral character, whether the fixing has behind it the authority of an Isaac Newton, a Winston Churchill or a Franklin Roosevelt.

That stability is dependent on the free operation of the forces making for stability. While the gold holdings of mankind operate freely to regulate the price level it is obviously undesirable that the value of a given quantity of gold—the measure in which values are expressed—should be changed. But when, over a lengthy period, the control which gold can exercise over the price level of commodities has been abolished it does not require much intelligence to see that the terms of the equation should be recalculated. In the 17th Century it was considered desirable to set the mathematical genius of a Newton to work on this task. In our age we have been satisfied with slap-dash methods.

If anything is fixed at a given point some force is required to keep it fixed there. The first of the forces operating in a metallic standard is that the issuing authority should be prepared at all times to buy and sell the monetary metal at the same price. The second force is the untrammelled right of the citizen to own, buy, sell, import or export the monetary metal. These forces are essential to the mechanism of sound money and any detraction from them reduces the efficacy of the monetary machine.

When these forces were eliminated the two sides of the equation soon parted company. The dollars and cents in which the price of commodities was expressed became paper money. As no great effort was required to produce it, one of the most important factors making for sound money, namely, the relative scarcity of the precious metals, disappeared from the field of currency. The price of gold was no longer expressed in terms of a scarce commodity but in terms of what in some countries became a drug on the market. Nobody found any difficulty in understanding that when the German mark depreciated two billion to one, the old equation could no longer be maintained. But they had great difficulty in seeing that when it required 1½, 1¾ or 2 paper pounds or dollars to buy the same quantity of commodities as one gold pound or dollar had bought before, the terms of the equation were also drastically changed.

New concrete and steel headframe

Can't Restore Value of Depreciated Moneys

Now it is true that while it is not possible to roll a stone uphill if the gradient becomes too steep, it is nonetheless possible to do so if there is only a relatively slight gradient. Can this parallel be applied to the forces that maintain the equation between gold and paper money?

In 1916 a fellow student of mine, greatly daring, told me: "Holloway, I prophesy that we shall still see the value of the German mark fall to one penny!" Neither of us foresaw at that time that it would fall to a point difficult to express as a vulgar fraction. When the mark did in fact reach the point where it was worth only a penny it should have been clear as daylight that no power on earth could ever push it back to the point where the same mark would again be worth twelve pence. We can disregard the subsequent plummeting although the post-first-world-war speculators in marks did not. The curious thing, however, is that when the British pound depreciated to less than ten shillings it was still deemed possible to roll it uphill to its old station and to re-establish the equation which existed in 1914.

That attempt was made by Winston Churchill in 1925. We know the results. After years of deflation and depressed trade Britain had to give up the vain struggle in September 1931. Sisyphus was beaten. Other countries followed during the next five years. The attempt to roll the stone uphill, even along a relatively slight gradient, had failed. The attempt to write up to higher values in gold the depreciated moneys which had been foisted on the community during the war and immediate post-

Modern equipment is used at this South African crushing installation

war years proved to be a greater burden than the mechanism of production could bear. These were the years during which the forces necessary for the preservation of sound money had been placed out of action by Government decree. Most people thought that raising the price of gold would launch a new inflation. They failed to understand that the inflation had already occurred, that it was impossible to reverse it, and that unless the measure of value were brought in line with the realities of the price level, a devastating deflation was the only alternative.

Debt, Credit Are Not Money

The reason for this disaster is clear enough if we go on studying the forces which cause the monetary mechanism to operate. In a highly developed society the means of subsistence of the workers, the materials which they use and the tools with which they produce must all be advanced long before the finished articles produce the income which pays for all these things. Inevitably, therefore, debt is created. But debt is not money. It performs none of the real functions of money. It is not a measure of value. It is not a medium of exchange. It is not a store of value. It is only a representative of these, an agent of its principal—money. One of the prime confusions, one of the reasons why so many people lose the thread in discussions about money, is that we have got used to using the word "debt" and its partner, "credit" as synonyms of money.

As debt has inevitably to play a large role in any highly developed society we must examine what new forces are set to work when the forces which maintained the equation between gold and paper money are put out of action. What happens then is that the amount of gold increases but slowly while the amount of paper money increases very fast. Obviously the terms of the two sides of the equation change in value. As the first one—a given quantity of gold—is prevented by decree from exerting its usual force all debts must be expressed in the second. The number of units of paper currency which express a given debt therefore increases as the volume of paper currency increases.

Now as long as this continues without setting up countervailing forces it is all to the good of the debtor. He can settle his past debts by giving something which is ever getting more plentiful. In fact one has read of debtors in a period of rapid inflation seeking out their creditors and paying them off mercilessly!

Disruption of Productivity

But this process soon sets up new forces, both on the productive and on the distributive side. On the productive side it destroys capital. One need only think of the balance sheet of a company carrying large quantities of machinery subject to heavy depreciation, or the large amounts of money derived from death duties and used for current needs to appreciate this.

On the distributive side it sets up no end for industrial disputes. It is curious how few people realize that all the production lost in such industrial disputes as are caused purely by the falling purchasing power of money is a direct result of a bad monetary mechanism. All that lost production is the price the community pays for working with a bad monetary mechanism instead of using the highly efficient mechanism of real money which has been developed through the ages.

When, however, we try to reverse the process—roll the stone uphill—when we try to restore the equation to what it was before one of the terms got out of hand, we inevitably increase the debtor's burden. In view of the large role that debt plays in the productive mechanism the effect of this new force is to put a heavy braking effect on the mechanism of production. If the amount of that force is great enough—or in customary jargon—if we deflate sufficiently far and sufficiently fast, we can bring the productive mechanism to an almost complete stop. This is what happened in the Great Depression and this is what will happen again if we try to roll the stone uphill, if we try to restore the equation by making the terms between gold and paper money match at the point where they matched before the war. We are therefore faced by the choice between bringing the price of gold into line with the vast quantites of paper money or facing a devastating depression, or going on with a bad and costly monetary mechanism forever more.

"Managed Money?"

"But" someone will object "you have not proved that managed money is bad money. You are tacitly assuming that mankind has found out all it can about a sound monetary mechanism. Is it not possible that monetary management can carry the age-old process of improving the monetary mechanism a stage further?"

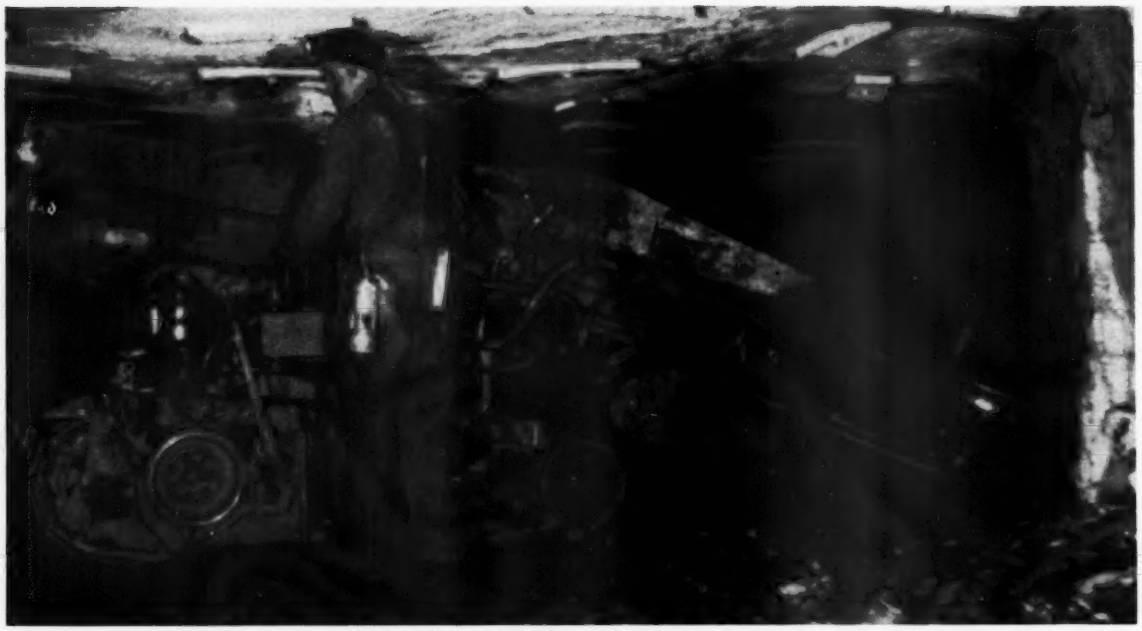
It is a fair question which must be squarely faced.

My analysis thus far has dealt with money as an instrument of production and as a component of distributive justice. Both of these aspects require as sound and unchanging a measure and store of value as possible to achieve maximum efficiency. Monetary management in effect claims that a higher *productive* efficiency can be attained if we treat the monetary mechanism not merely as a mechanism of production but also as an instrument of policy. It does not indeed claim that a higher distributive efficiency is gained by management. Such a claim would be moronish fatuity in face of the fact that even the strongest currencies have lost half of their value in a decade.

How is this higher level of productivity to be attained? "Simply," so the reply would run, "by causing enough pressure to be exerted on the demand side to ensure full employment. We can maintain this demand by injecting more fiat money into the mechanism whenever this is required. To be able to do this however, we must be freed from the discipline of a rigid standard of value."

(Continued on page 49)

Shaft sinking with native labor



There was not one roof-fall accident at the Green Valley mine in the first six months of the year

Roof Bolting Reduces Accidents and Costs

Two and a Half Year's Experience with Roof Bolting in an Indiana Mine has Shown a Marked Drop in Accidents and a Reduction of 14 Cents per Ton in Production Costs

By NATHANIEL KIRK
Mine Superintendent
Snow Hill Coal Corp.

THE Green Valley Mine of the Snow Hill Coal Corp. is located five miles northwest of Terre Haute in Vigo County, Ind. At the present time mining is being done in the Indiana No. 3 seam, which is 72 in. thick and is approximately 600 ft deep. The mine is classified gassy, and produces over 1,000,000 cu ft of gas every 24 hours. A total of 303 employes are on the payroll, and production is about 4400 tons a day.

Coal is cut by universal cutting machines, drilled with double arm drills, blasted with air, loaded out with crawler mounted loaders into 10 SC shuttle cars, and dumped into five-ton mine cars. A total of five units work two shifts per day at present.

Roof bolting is done by two men working as a team on each crew. A unit consists of three Joy RBD 11 double arm drills mounted on rubber, one Joy RBD 7 single arm drill mounted on a crawler truck, and one Chicago Pneumatic double arm drill, also mounted on a crawler truck. All drills were bought new from the manufacturers; however, the mounting of the two arms on the Chicago Pneumatic drill was done at the mine shop.

Roof consists of a gray shale with numerous slips and partings that cause it to fall easily. Drilling of the roof offers no great problem, and two men often put in more than 200 bolts in one shift with the double arm drills.

The room and pillar method of mining is used. But pillars are not recovered. The bottoms have a tendency to heave after standing for some time, and although there is six ft of coal, bottoms have to be brushed in motor road entries.

Former Timbering Method

Prior to roof bolting, a system of pin timbering with steel rail bars was used along all the motor roads, with rail bars being set on three-ft centers. This was an expensive operation, because first the place had to be timbered during the loading-out operation. Secondly, it required following up to pin timber later. The pin timbering was not a part of the loading cycle and was usually way behind which resulted in overtime on Saturdays and Sundays. On producing side entries, rails on legs were set on 3½-ft centers, and wood bars on legs were set on four-ft centers in all rooms, with additional props set on each side.

All crosscut intersections used for haulage purposes were timbered with steel rails, by using 12, 14 and 16-ft rails for clearance purposes. All rooms and entries were timbered to within 12 ft of the face before any other operation was done, and safety posts were set thereafter. This was in compliance with the State of Indiana Mining Laws.

Even with all precautions taken, face accidents from roof falls were high. Timbering costs also were very high—more rails were used to hold up the roof than were used for track.

To replace this, roof bolting was started at the mine in 1949. It was discontinued in a short time because management claimed it found that bolts were being put up six months after the coal had been removed.

At the beginning of 1952 a change in top management took place in the company, and the new management started reducing roof-fall accidents. On May 19 of that year another trial installation of roof bolting was started. After it proved successful, all units were equipped with roof bolting machines. Since the beginning of 1953, the mine has been working under roof bolts 100 percent.

Everybody Works Under Bolted Top

The rule set up by management is that all places must be roof bolted on four-ft centers up to the face before any other work is done in that place. Today there are no men exposed to unbolted roofs. Roof bolters are furnished with a screw jack to be used as a safety post while bolting. At the present time between 1400 and 1500 roof bolts are being installed every 24 hours. Both ⅝ and ¾-in. bolts with three by three-in. steel plates are used. Bolts are four ft long, and are purchased with the palnut expansion shell and steel plate already assembled.

On motor roads with a life of two or more years, six-lb steel tie sections six in. wide and ten ft long, (with a hole on each end and one in the middle) are bolted up on a three-ft center wooden header. In remaining workings, both rooms and entries are bolted with boards one in. thick, six in. wide and 20 in. long.

Where doubtful roof is encountered, cross bars of steel or wood, and sometimes both, are used along with the bolting. Cribs are built in practically all crosscuts along the motor roads and in numerous crosscuts in the side entries. Ofttimes rails or bars are recovered, leaving only the bolts where the roof is doubtful, and the top will still stand. The bolts would have held without the timbers.

Even with bolts, steel bars, wooden bars, and cribs, falls occur that will crush all supports.

Torque testing and pull tests on the bolts by experienced engineers are required periodically. Recovery of roof bolts is done by some of the older experienced miners by setting safety posts and then removing the bolts with hand wrenches.

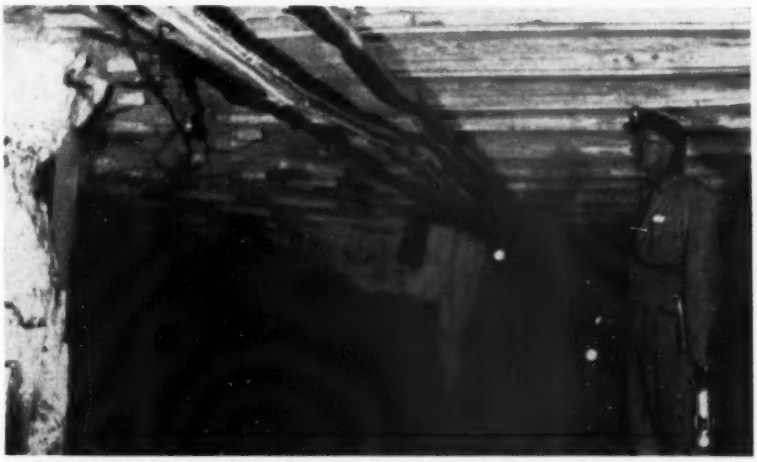
Accident Reduction Record

Let's look at results from an accident viewpoint. In 1950 there were 13 roof fall compensable accidents for 32,389 tons per accident and a total of 21 compensable accidents, for 20,050 tons production per accident.

In 1951, 19 roof fall accidents occurred for a production of 27,936 tons per accident, and there were 46 compensable accidents for 11,538 tons per accident.

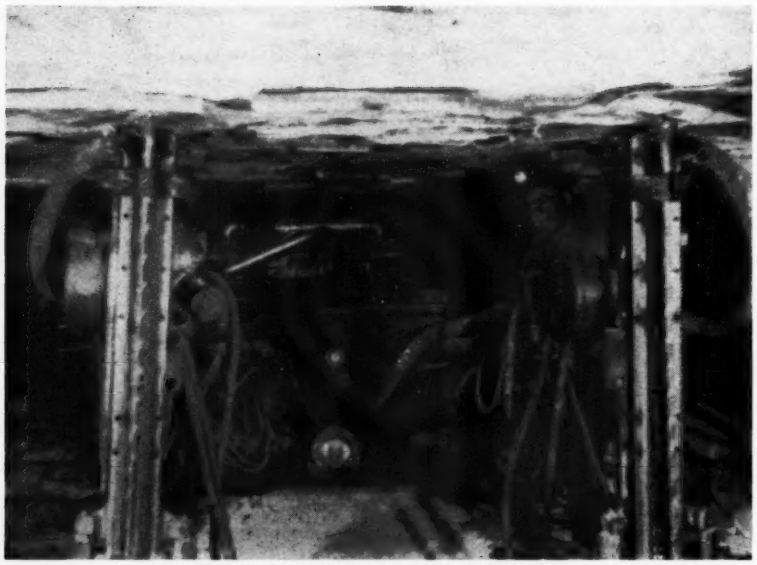
In 1952, 16 compensable roof fall

A turnout timbered in the old way. Note the number of rails used as crossbars



A roof bolted turnout. Not only is less material used, but the place is supported as the coal is mined, which was not true with the earlier method used

In some places falls occur even when top is supported with bolts, steel bars, wooden bars and cribs



Roof bolting drills are crawler mounted

accidents allowed a production of 33,946 tons per accident and a total of 31 accidents for the year showed 17,520 tons per accident.

In 1953, when the mine went to 100 percent roof bolting, five accidents were charged up to roof falls and roof bolting for 163,765 tons per accident. In 1953 there was a total of 15 accidents for 53,588 tons per accident.

In 1954 five accidents were again charged against roof falls and roof bolting resulting in 175,540 tons per accident. Two of these men were hurt tramming the roof bolts. Two of them were hurt taking out safety props after they had recovered bolts, one when the post struck him, and the second when a small piece of slate hit him on the foot. The fifth man received a mashed finger when he had it caught between the cap board and roof bolter. None of these accidents were the fault of bolting; they were due to men working on new equipment with which they were not familiar. In 1954 there were 13 accidents for a production of 66,746 tons per accident.

Now, let's look at the figures for the first six months of 1955. The company mined 538,349 tons of coal without a single roof fall accident, and in the same period there were only two compensable accidents. This resulted in a production of 269,174 tons per accident. Also, up until June 30, 1955, there had been mined 811,891 tons since the last roof fall accident on September 9, 1954, and 3,628,350 tons since the last fatal accident in June 1951.

In comparing the years 1951 and 1952, when they were timbering, against the years 1953 and 1954, when they were bolting, you will note a reduction from 35 roof fall accidents and 77 compensable accidents, to 10 roof fall accidents and 28 compensable accidents in 1953 and 1954—truly a remarkable reduction.

Reduce Production Costs

Now, let's look at the production results. In 1950 the company mined 421,063 tons of coal for the year or a total of 2097 tons per day with 270 men on the payroll. In 1952 it mined 543,140 tons for the year or 2894 tons per day with 312 men on the payroll. In 1953, when it went 100 percent roof bolting, it mined 818,825 tons for the year and 3660 tons per day with 277 men on the payroll.

In 1954, 867,703 tons were mined for the year, and 4095 tons per day with 279 men on the payroll. For the first six months of 1955, 538,349 tons were mined, a total of 4412 tons per day, with 303 men on the payroll. Roof bolting has helped in both reducing accidents and in increasing production.

Let's compare "Safety" costs. Some of the hidden costs, cleaning up behind timbers on timbered sections, and the like, cannot be told, but they do favor roof bolting, as a roof bolted section is far easier to keep clean than a timbered section. Supply delivery is also greatly reduced by roof bolting. For the purpose of this comparison, take into consideration labor, supply, and compensation costs. The reduced labor on supply loading and delivery, and the fewer men required to clean up, come close to equaling the cost of labor and supplies for the upkeep of the roof bolting machines.

Take again the two years, 1951 and 1952, when the company was timbering and compare them to 1953 and 1954, when it was roof bolting. In 1951 and 1952, labor cost for timbering was 0.2790 per ton, supplies 0.2912, compensation 0.1102, for a total of 0.6804 cents per ton. In 1953 and 1954, labor cost for roof bolting and timbering was 0.1692 per ton, supplies 0.2967, compensation 0.0745 for a total of 0.5405 cents per ton. These figures show that in the years 1953 and 1954 the company not only made the miner safer and raised production, but also saved 14 cents in timbering on each ton of coal mined.

The reason for this saving, of course, is an increased rate of production. In 1951 and 1952 it produced an average of 2687 tons of coal per day with an average of 296 men on the payroll, while in 1953 and 1954 it averaged 3877 tons per day with an average of 278 men on the payroll. In other words, the company mined 1190 tons of coal more per day with 18 fewer men on the payroll.

Article based on paper presented before the National Safety Council, October 17-19.

When driving entries, channel sections are installed right up to the face

Fiatt, Illinois Mine uses STANOIL *Industrial Oil in stripper hydraulic jacks for 18 years*

At Truax-Traer Coal Company's Fiatt, Illinois, mine, the production goal is 1,000 tons of coal an hour. That's a stiff assignment. It leaves no margin for failure. This indeed applies to the hydraulic jacks of the company's Bucyrus-Erie 950-B stripper. It's the reason STANOIL Industrial Oil has been used as the hydraulic fluid in the four hydraulic jacks since the stripper went into operation in 1937. Eighteen years continuous service is testimony to STANOIL's ability to deliver under any operating condition—heat, cold, rain, dust, dirt.

But there's more to the story than just the ability of STANOIL Industrial Oil to deliver under a wide range of operating conditions. The rest of the story is the Standard technical service provided by men with training and experience.

This combination — (1) top quality products (2) technical service provided by experienced men — is ready to serve you. Want this combination to go to work for you? In the midwest just call your nearby Standard Oil lubrication specialist. Or contact: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Since start of operations in 1937, STANOIL Industrial Oil has been used as hydraulic fluid in Bucyrus-Erie stripper at Truax-Traer Coal Company mine, Fiatt, Illinois. This 950-B stripper is hub of one of the biggest strip mining operations in Fulton County, state's second largest coal producing county.

Bob Wright, Standard Oil lubrication specialist is on the spot to provide technical service on lubrication problems. Bob has a B.S. in engineering from Michigan College of Mining. Before entering field sales work, Bob completed Standard's Sales Engineering School course in industrial lubrication. Customers find this experience and background pay off *for them*.

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Since no special equipment is needed for reconditioning bits or threading rods, you owe it to yourself to try a can of CRD bits. They're ideal for roof bolting and for use in your stopes as well as in your headings. A short trial will give you first-hand information on the ability of these bits to cut drilling costs in your property, as they have in so many others.

Bulletin RD-29 gives detailed information. A copy is yours for the asking — just write for it.

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	1⅜	Deep Green		1 9/16	Yellow
	1 7/16	Brown		1⅝	White
	1½	Grey		1 11/16	Black
	1 9/16	Maroon		1¾	Red
	1⅝	Deep Blue		1 13/16	Blue
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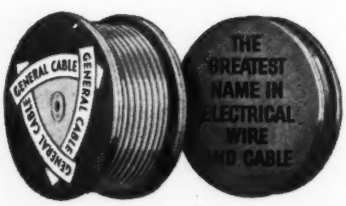

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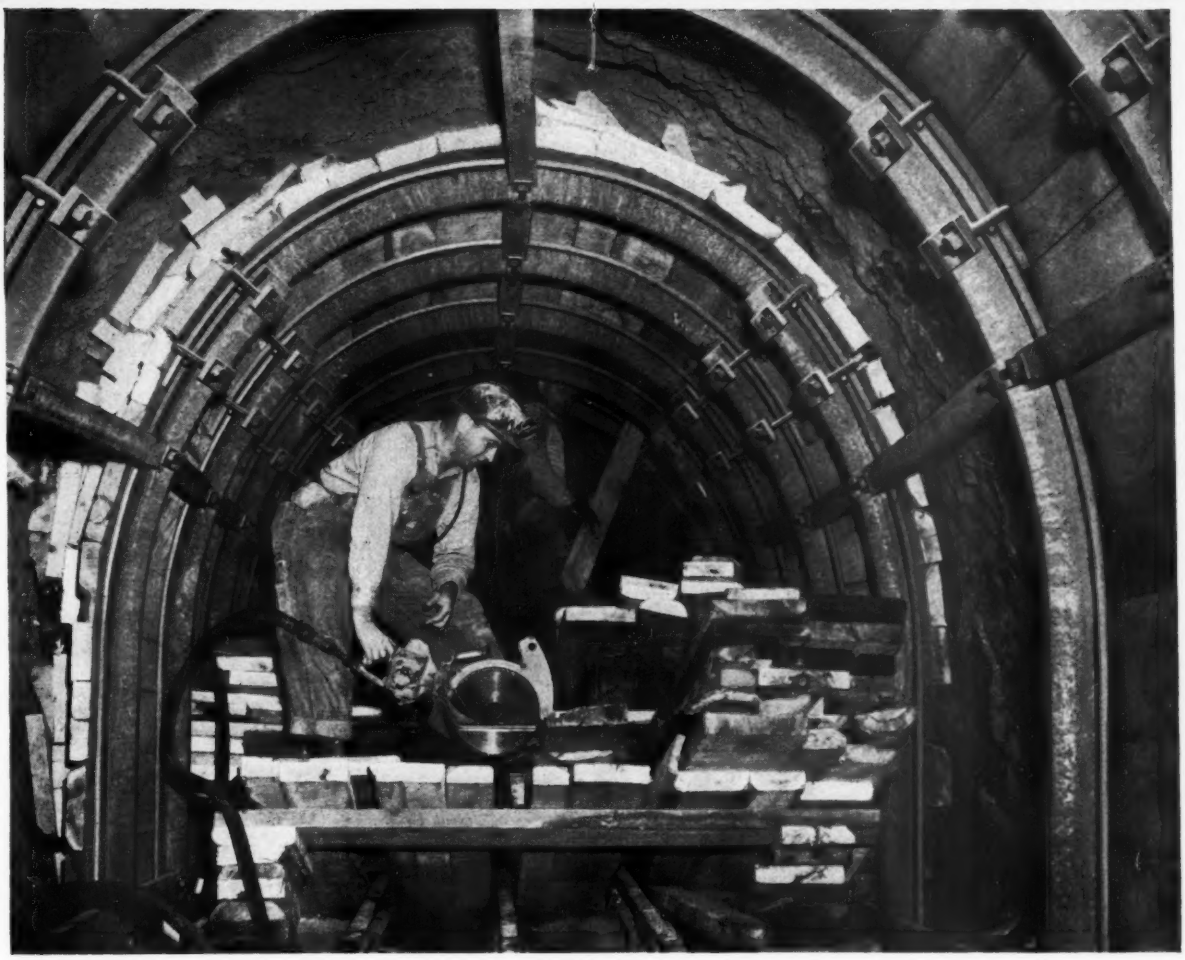

Yieldable Mine Roof Support Means Greater Safety and Less Cost

We're in a slusher drift at an Eastern ore mine. The workmen have completed the erection of those steel arches and are now installing lagging to finish off the job.

The arches have probably caught your eye, and well they might for they represent one of the greatest advances in mine safety in recent years. From now on, you will be hearing a lot about the Bethlehem Yieldable Mine Arch!

Each arch consists of rolled-steel segments, nested into one another and bolted together at points of overlap. Joints are made with U-bolt clamps drawn tight enough to hold fast under normal loads. But when unusually heavy pressures begin to bear down, the joints permit the nested segments to slide or yield before deformation of the steel can take place. The load is thus relieved and the structural integrity of the arch is maintained. The safety of underground personnel is secure, and the roof structure itself continues in service undamaged.

The impressive appearance of the Yieldable Arch may suggest a luxury item, but exactly the reverse is true. The fact is, you can safely figure on regaining the reasonable first cost of the Yieldable Arch in its first year of service. These steel arches will far outlive heavy timber supports, and have the very important advantage of recoverability. One of our engineers will be glad to describe this safety development in full detail at your convenience.

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Southwest opening of the Jackpile mine shows typical topography

Exploration Drilling for Uranium By the Anaconda Company

Drilling, Sampling, Hole Location and General Exploration Techniques Used in The Grants-Laguna Districts Are Described in Detail

By R. D. LYNN
Geologist
The Anaconda Company

EXPLORATION drilling for uranium by The Anaconda Company has been limited primarily to the Grants —Laguna District of New Mexico.

The bulk of the prospect drilling has been done in the Todilto limestone and Morrison sandstone formations, and more recently in the Entrada sandstone as well. In order to prospect these formations it has oftentimes been necessary to penetrate considerable thicknesses of overlying cover particularly when drilling the Morrison. In the Grants-Laguna District the Morrison seldom presents a natural drilling surface. The overlying Dakota sandstone which caps many Morrison mesas does not offer a good drilling surface, but when the drilling progresses back away from the rims the full thickness of the Dakota not only has to be drilled but oftentimes many feet of overlying Mancos mudstone. Thus far exploration hole depths have usually been less than 600 ft with the average approximately 300 ft.

The Todilto limestone and the Entrada sandstone have been more accessible to drilling. The Todilto limestone forms a resistant cap on many Entrada benches and both formations are prospected simultaneously. Large Todilto dip slopes present exceptionally good drilling surfaces. Usually only a few feet of alluvium and frequently some Summerville are drilled before reaching the Todilto limestone. The Entrada sandstone is not prospected in all of the areas in which the Todilto limestone is the prime objective, but when it is penetrated only an additional 40 to 50 ft of hole beyond the base of the Todilto is necessary.

Drill 60,000 Ft Per Month

Three types of drills have been utilized in exploration drilling, including the diamond-core drill, the rotary type drills, such as the Winter-Weiss Portadrill, the Failing, the Mayhew, and the percussion wagon drill. All drills are truck mounted and equipped for sample recovery. Each drill seems to have its particular place in the exploration program, but the diamond-core drill has been the most versatile and reliable, particularly when samples have been required. The diamond-core drill seems best suited for delimiting ore bodies in either wet or dry ground, and for examining the subsurface lithology it is indispensable. The rotary drills are used to good advantage in dry ground either for sample or non-sample drilling, and in wet ground when gamma and resistivity logging

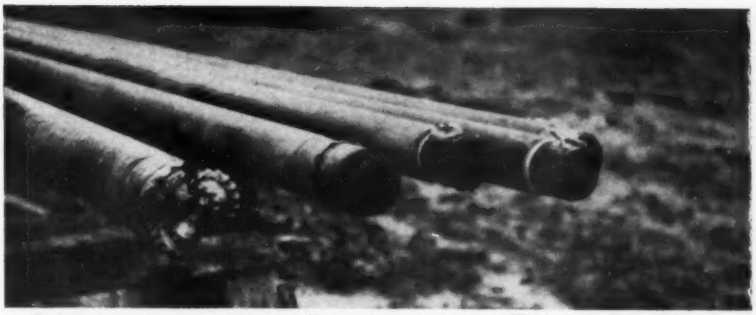
have been employed. The wagon drill is best suited for Todilto limestone prospecting either for sample drilling in dry ground or non-sample drilling in wet ground. In Todilto areas where igneous intrusives have somewhat silicified the limestone the wagon drill is decidedly superior to the rotary drill.

Currently about 50,000 ft of rotary-percussion drill hole and 10,000 ft of diamond drill hole per month are being completed in the exploration program.

Wireline Equipment Used

Sampling has been a very important part of exploration drilling with the vast majority of all holes having been sampled either by taking core or by recovering dry-blown chip samples. All ore to date has been outlined by sample drilling. The diamond-core drill has been the most reliable all-round sampler, but very satisfactory sample results have been obtained from the rotary and percussion drills.

The diamond-core drills are equipped with wireline core recovery equipment which cuts a BX size core. Prior to the installation of wireline equipment, NX size core was normally recovered. Wireline has been found to be superior and has replaced the standard NX equipment. Drilling costs per ft have been substantially reduced by wireline as a result of a 50 percent increase in ft drilled per machine per shift. Core recovery has improved nearly 10 percent and consequently better samples and a more complete examination of the geology have been made possible. In some instances when core has not been desired in the upper portions of the holes a rotary type tricone-roller bit has been utilized with the diamond drills.



At left is a non-coring tricone roller and next to it an NX size wireline diamond bit which cuts a BX core

The drill cores are marked for sample and assay intervals according to the lithology, core recovery, and mineralization, and are logged geologically, usually after splitting.

Higher Assays in Fines

The rotary and percussion drills utilize compressed air for the ejection of cuttings, usually with an arbitrary sampling interval of two ft. Samples of the dry cuttings are caught at the surface in two containers, the coarse sample catcher and the fine sample catcher. Some fine sample material is unavoidably lost with the final air exhaust. The combination of the material from the coarse and fine sample catchers constitutes the sample for any particular interval drilled, usually two ft. Experimentation has shown that in the Morrison sandstone the fines retained in the fine sample catcher will sometimes assay two to three times more than the coarser material trapped by the coarse sample catcher. It is probably a safe assumption that even higher assay values are lost in the fine dust discharged out of the exhaust stack although no tests have been made to confirm this. The net result of these conditions has been conservative assays for dry-blown chip samples. This same relationship is not so evident in Todilto limestone sampling where the mineralization usually occurs disseminated in a denser host. The Morrison sandstone crumbles to a fine sand when drilled, thereby physically liberating some of the finer grained mineralization which occurs as a coating on the sand particles.

Values Checked Underground

The sampling techniques now employed have evolved gradually and are based upon numerous tests. At the Jackpile Mine the core drill sample assays have been verified by extensive underground development work. Several raises have been driven on diamond drill holes through the ore and low-grade intervals. The material from each raise round constituted a sample and the limits of the raise round were chosen so that they would correspond to core sample intervals. Precautions were taken with each raise round sample to prevent salting or dilution so that reasonably accurate comparisons could be made with each corresponding diamond core sample. These bulk sample tests were deemed desirable in order to determine the feasibility of stripping the Jackpile orebody by open-pit. Sample assay checks have also been made on rotary drill samples by underground raise rounds, by core samples, by underground channel samples, and by calyx drilling. The sample assay results were found to be on the conservative side and within acceptable limits.

Periodically the rotary and percussion drill samples are weighed in order to determine the approximate quality and quantity of sample recovery. Other factors besides sample weight have been considered in determining the sample recovery of non-coring drills. Proper size samples do

A typical roll in the Todilto limestone. Note the cap for scale

Rotary drill setup for air-blown chip sampling

A 36-in. calyx core which furnished a bulk sample to verify a small rotary drill hole sample

not necessarily indicate good sampling. Too much air in soft ground, improper use of reamers on the drill stem, and inexperienced drilling have been factors contributing to poor sampling even though the sample recovered appeared to be adequate. The interpretation of sample assay logs has been helpful in determining the quality of the rotary and wagon drill samples taken. A constant similarity of assay values progressing down the hole tends to raise doubt as to the reliability of the sampling.

Gamma ray logging of exploratory drill holes has been helpful and economical under certain limited conditions and for specific purposes.

Gamma Log Applications

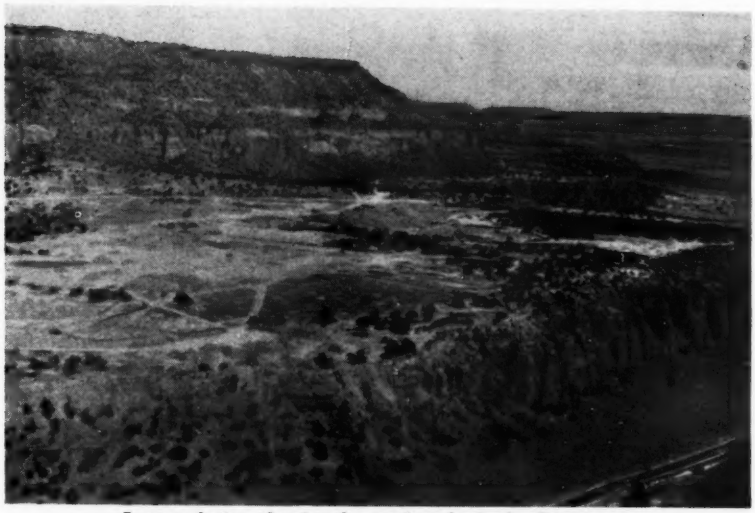
The gamma log has been found to be most useful in wildcat drilling where no samples have been taken and in sampled holes where sample recovery has been poor or nil. No effort has been made to employ the gamma log as a substitute for sampling in development drilling of an ore body. Experience has shown that this is not good practice. So many unforeseen obstacles to accurate gamma logging may exist in a drill hole that it is doubtful whether much reliance can be placed on the results of a gamma logging device where estimation of ore reserves, choice of mining methods, and substantial development costs are involved. In wildcat drilling the gamma ray log has been used in detecting mineralization in a positive or negative manner, that is, in detecting whether a radioactive anomaly is present in the hole or whether the hole is devoid of abnormal radioactivity. If sufficient positive evidence is presented by the gamma log then sampling methods are employed to determine the merits of the showing found. In wildcat drilling the gamma probe offers this advantage: where thin streaks of radioactive mineral may be masked in a rotary or wagon drill sample interval, the gamma log will generally note them. This advantage also exists in the case of core drilling where the core recovery has been poor.

The utilization of the gamma ray log has added measurably to the scope of the exploration program but its limitations have been recognized and its cheapness of operation has not eliminated the necessity of more expensive sample procedures when ore has been found. The gamma ray log has been supplemented by a resistivity log for lithologic information. A diamond-core drill has been used to correlate the resistivity logs in new areas.

Grid Patterns

Exploration drill hole patterns can generally be classified into two types, the geometric grid and transverse or roll pattern. The local environment and the particular objective desired usually have determined the most suitable drill pattern. The major portion of the exploration drilling has been concerned with flat-lying and gently dipping bedded deposits in sandstones and shaly sandstones. However, in the Todilto limestone, mineralization has often been found associated with small structural rolls or anticlines, abnormally thick limestone sections, and locally bleached or color-altered zones in the overlying red Summerville sandstone. Prospecting has been aided by the utilization of these characteristics. Todilto anticlines are usually very small gentle (although at times tightly folded) structures seldom exceeding 40 ft across and it has been necessary to employ close engineering control and

Angle drilling has been more informative than vertical drilling at the Woodrow mine



A general view showing the stratigraphy in the Grants area

geologic hole logging in order to stay with the roll. A satisfactory drilling system has been used wherein drill hole rows have been spaced at varying intervals and oriented so that they intersect the projected roll axis at right angles. The rows may be up to 100 or so ft apart but the holes on each row may be placed as close as five ft from center to center. This type of pattern has been called transverse drilling. On broad expressionless Todilto benches grid pattern drilling is used to supplement the transverse type drilling. Hole spacing varies, but the general tendency has been to drill on broad centers, possibly 200 ft, looking for favorable features. If any mineralization or characteristics indicative of mineralization are found then the hole spacings are reduced in some cases down to ten or 20 ft. The irregular shapes of most Todilto limestone ore bodies have necessitated close development drilling in order to arrive at a reasonably sound basis for reserve estimates. Ore cutoffs sometimes may be very abrupt in the Todilto limestone, and it is not unusual to have ten ft of ore in a hole and two or three ft away have a barren hole.

Exploration drilling in the Morrison has been more expensive than drilling in the Todilto limestone. Some of the factors that have added to the expense of drilling the Morrison are: greater hole depths, greater uncertainty in knowing whether or not the holes are deep enough, more difficult overburden to penetrate, and the difficulty in drilling the Morrison itself. Drilling patterns used in prospecting the Morrison formation have been much the same as those used in Todilto prospecting. Transverse type drilling has been utilized in exploring ore trends and also in exploring structural and sedimentary trends. In Morrison drilling, as in Todilto drilling, geologic hole logging and engineering control together with the construction of plan maps and cross sections, have been essential. Wildcat drilling has generally been carried out on 600 to 1000-ft centers and then reduced to 100 and 200-ft grids when favorable features have been found. Outlining ore bodies has been accomplished by 50-ft grid drilling in most cases, but relatively small ore bodies have been developed by closer drilling.

Drilled Vertical Pipe

Not all Morrison exploration drilling has been for bedded deposits. The Woodrow Orebody, which is in a small nearly vertical breccia pipe, has presented a more technical drilling problem than the bedded deposits. Core mapping and engineering control along with some descriptive geometry have been necessary in placing each hole. Angle drilling rather than vertical drilling has been most informative at the Woodrow Mine due to its small size and steep attitude.

Role of Gold

(Continued from page 37)

This is not my thesis. It is, in a highly simplified form, the quintessence of the argument of the managed moneyers. It is the position they will have to establish if they wish to hold the field against the proved excellence of the discipline of a rigid standard of value.

The examination of this thesis would lead us into so many bypaths of theory that it is obviously not to be attempted in this paper. There is, however, one implication of such transcendental importance in this theory of money that the full floodlight of inquiry should be focussed on it. If the money of the people is to be managed somebody must do the managing. From this follows the implication that sufficient power must be vested in the managers. A third implication is that such power must be used purely for the purposes of the end in view. It must not be prostituted towards any other purpose. A fourth implication is that the community must have sufficient confidence in the knowledge, and in the integrity and in the judgment of the managers to entrust such vast power to them. A final far-reaching implication is that such a monetary system must inevitably be authoritarian since the timing and secrecy which are its essentials do not conform to the pattern of work of a deliberative legislature.

In one of the most pregnant sentences in all political philosophy Oliver Cromwell said: "We all believe in government by consent, but where shall that consent be found?" Describing the English Revolution of 1688 Lord Acton wrote: "For the divine right of Kings that revolution substituted the divine right of property owners." Must we now by consent create the divine right of managed moneyers?

The late Harry Dexter White, who, more than any other man, built the present authoritarian defenses into the United States Treasury wrote in 1945: "The gold standard has repeatedly broken down under the strain of acute emergencies." (Foreign Affairs, January 1945). Can it, however, be forgotten that in time of war many freedoms break down, the freedom of buying what one wants, going where one wants, saying what one wants, trading where one wants, and the greatest of all, the sanctity of human life. But when a war is over every civilized state which sets any store by individual liberty subjects all of these matters as soon as possible to the due process of law. It seems to me that a monetary mechanism that would give the management freedom to take away the money of the people without due process of law is not only a denial of all rights of legislatures but a frontal attack on individual liberty.

I must confess that I have no belief that in monetary management we have found a better monetary mechanism. For me gold is liberty.

Carbon Brushes and Machine Maintenance

Brushes, Though Expendable, Are Often the Determining Factor in Proper Performance of Electrical Equipment

By F. K. LUTZ
Staff Engineer
National Carbon Co.
A Division of Union Carbide & Carbon Corp.

IT has been truthfully said that equipment maintenance consists in keeping the equipment in the same good condition in which it was delivered by the manufacturer. This involves an unending battle against deterioration caused by time and temperature, and the ever present forces of dirt and contamination. The battle can be won only by diligent effort, properly applied, and an understanding of cause and effect.

Carbon brushes are expendable items, whose function is to give a full measure of satisfactory service as vital parts of the machine; when they are worn out, they are discarded and replaced. But brush life span, and the quality of performance given by brushes are so dependent on many other factors that a brief glance at some of these may point the way to improved machine operation through proper maintenance. For this purpose, we shall discuss several items which, taken singly or in combination, will seriously affect brush performance and may make good machine operation utterly impossible.

The Commutator Surface

If a brush is to maintain uninterrupted contact with a commutator rotating at speeds up to 10,000 fpm, it is obvious that the commutator surface must be smooth and truly cylindrical within extremely close limits. It must be free from high or low bars as well as rough or flat spots. Otherwise it is almost certain that there will be destructive arcing as the brush is forced to leave the commutator. Sandpapering, stoning or turning—depending on commutator condition, size of machine and available equipment—will bring the commutator surface back to its original smooth, true condition whenever it becomes necessary as indicated by arcing or noise at the brushes.

Load Conditions

Electrographitic brushes, which are the type most widely used, are sensitive to load conditions because the load has a great deal to do with the amount of film deposited by these brushes. At light loads, say 25 amp per sq in. of brush area, the brushes form less film than they would if carrying heavier loads, such as 75 amp per sq in. This lack of adequate film formation at light loads may bring about brush chatter and threading of the commutator. Conversely, heavy sustained loads may cause too much film deposition resulting in too high contact drop. Bar smutting or burning is quite likely to occur if a heavy film is ruptured because of the high contact drop. Fortunately, this situation lends itself to some control by brush grade selection because certain grades have inherently greater film forming ability than others. By carefully considering load conditions and by properly selecting brush grade, it is usually possible to form and maintain a relatively stable film on the commutator.

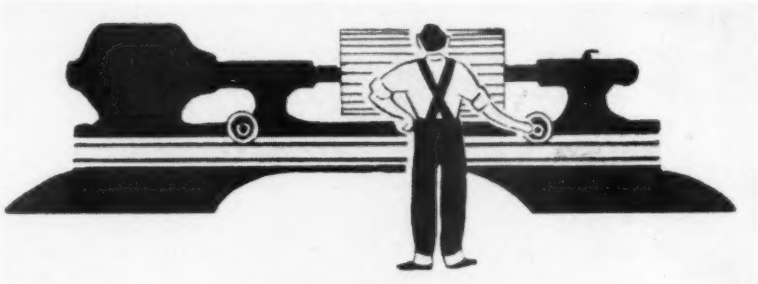
Atmospheric Conditions

Equally important in maintaining a proper commutator film is the machine environment and the quality of the air which reaches the commutator. Certain chemical fumes attack the surface film and cause a decided increase in brush friction. Oil vapors often cause a heavy smudging or dark streaking. Oil in the commutator slots attracts foreign particles such as carbon and copper dust which may cause short circuited bars. Even the humidity of the atmosphere is a factor in maintaining proper film.

Introduction of silicone insulation for the windings of enclosed machines brought with it a problem of rapid brush wear caused by the deposition of silicone decomposition products on the commutator surface. The accumulation of carbon dust in the windings brought about by this rapid brush wear tended to lower the insulation values dangerously. Until recently there have been no known brush grades capable of operating in silicone atmospheres at high temperatures without showing greatly accelerated wear, but technological advances founded on modern research have provided an answer to this problem. Proper maintenance of machines in contaminated atmospheres calls for elimination of the contaminant where possible, and a careful selection of brush materials where the cause of the trouble cannot be removed.

High or Side Mica

With hard, white mica in general use today as commutator bar insulation it is practically mandatory that the mica be kept under-flush and that none of it be left on the sides of the bars after undercutting. The total removal of mica from the sides of all bars requires painstaking care, but is worth the effort, because such things as sparking, burned bars and embedded copper in the brush faces can frequently be directly traced to high or side mica. Modern, non-abrasive brushes cannot successfully cope with mica which protrudes above the copper.



Commutator surface must be smooth

Brush Pressure

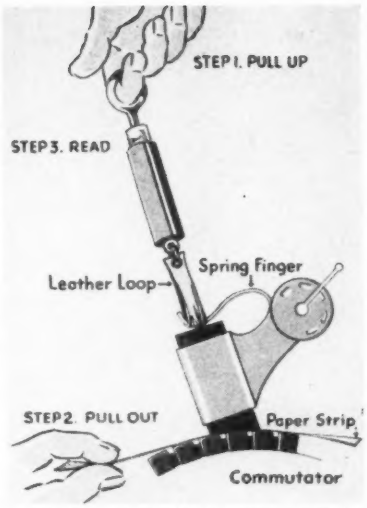
Improper pressure and unequal pressure are common causes of unsatisfactory brush operation. More often than not it is found that the pressure is too light. Usually, this is attributable to weak springs, to no resetting of spring pressure as springs wear down or to a mistaken belief by the maintainer that low

pressure is desirable. As shown by Figure 1 there is an optimum range of pressure which produces a minimum rate of brush wear on stationary industrial equipment where machine vibration is not a problem. If the pressure is too light, the contact between brush and commutator will be unstable, and the under-brush arcing caused by this condition will result in accelerated wear of the brush which may be defined as electrical wear. If this pressure is too great, the increased rate of wear will be primarily of mechanical origin, but will not be as pronounced as would be the case if electrical wear were dominant. It is wise to follow the brush manufacturer's recommendations regarding pressure, and if there must be deviations, let them be on the high side. Ordinarily it will be found that these recommendations are on the order of 2 to 3 lb per sq in. of brush cross sectional area where stationary industrial equipment is involved, and higher pressures on mine locomotive motors and electric shovel equipment where considerable vibration is present.

Also, to avoid selective action between brushes it is important that uniform pressure be maintained on all the brushes in the set. The contact drop at the brush face is affected by brush pressure, and non-uniform pressure produces different contact drops at different brushes. Those having the lowest contact drop then carry an abnormal proportion of the current. This results in abnormal heating of those brushes as well as possible oxidation of their shunt cables and damage to the shunt connections.

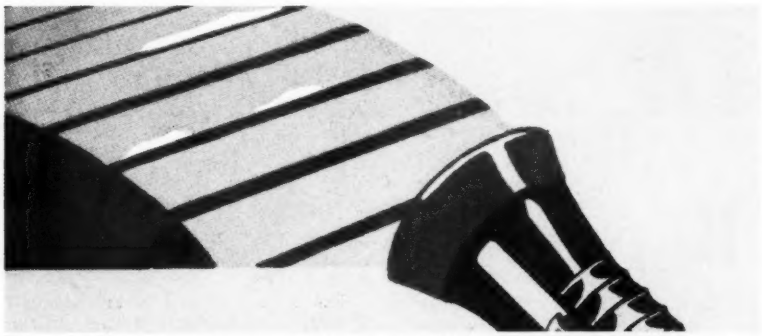
Alignment and Spacing of Brush Holders

For various reasons the brushes on a given arm sometimes get out of alignment with the commutator bars, a fault easily observed. The effect of such misalignment is an increase in the overall span of the brushes, thereby prolonging the commutation period. This may make it actually impossible to prevent sparking. The brushes farthest out of line will be exposed to destructive sparking that would not occur if all the brushes were correctly aligned.



How to measure brush pressure with a tension scale

Another major fault that must be corrected to obtain satisfactory operation is the unequal spacing of brushes around the commutator. When this condition exists, circulating currents flow between brush studs of the same polarity which may result in abnormal heating of the armature winding and excessive currents in the brushes. By stretching a strip of paper around the commutator under the brushes and marking it with a pencil at the toe of each brush on the strip, it can easily be determined by measuring, whether the spaces between the pencil marks are equal. If not, the brush holder supports should be adjusted to bring about equal spacing.



Such things as sparking, burned bars, and embedded copper in the brush faces can be frequently traced to high or side mica

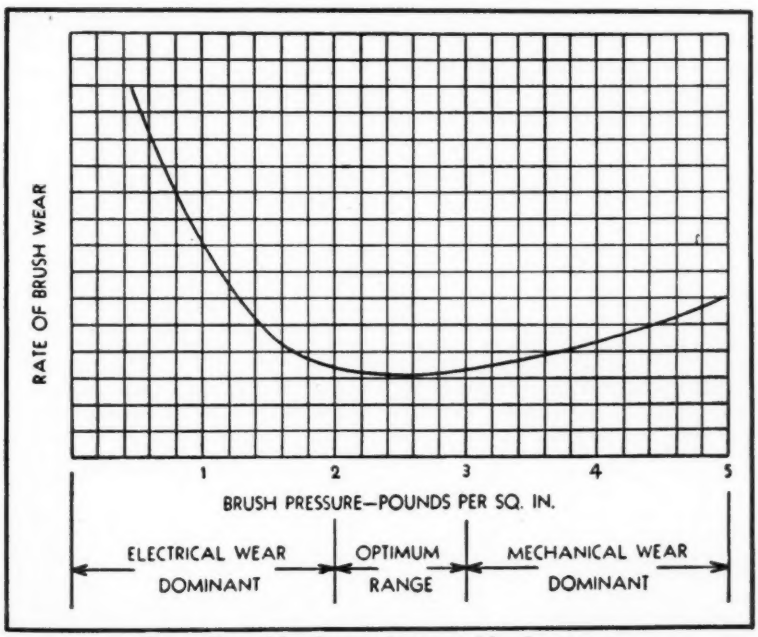
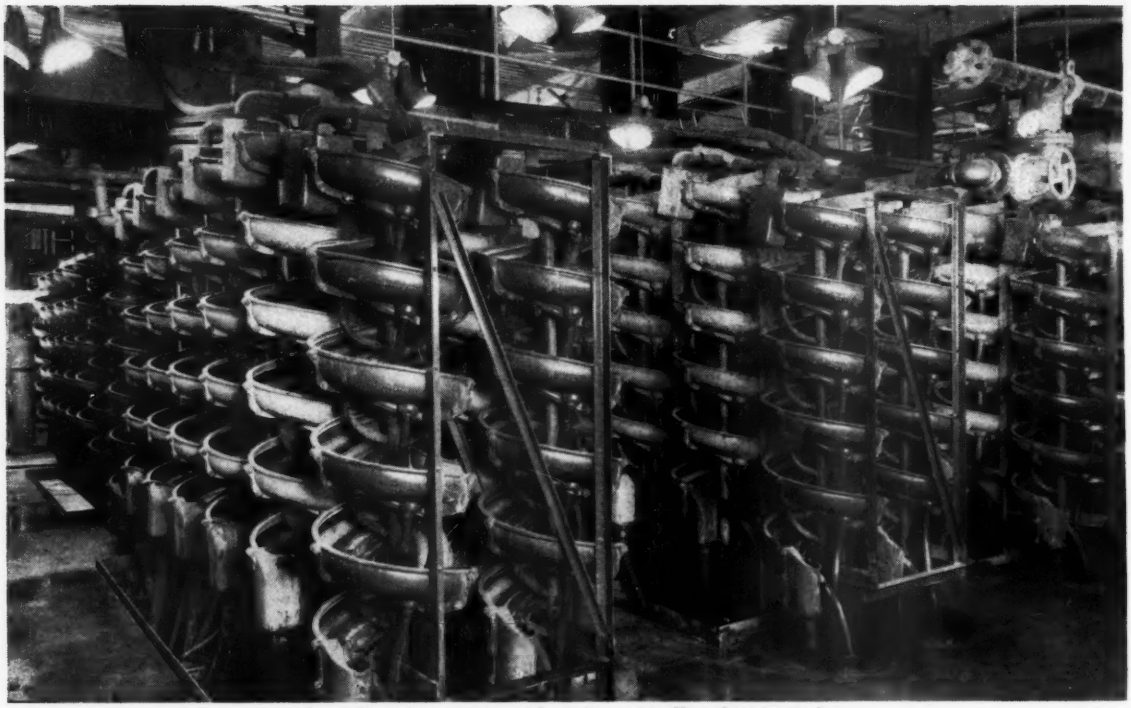


Fig. 1—Rate of brush wear in terms of brush pressure

Brush Grades

The selection of the proper grade of brush for a given machine, to meet a given set of operating conditions, is not a simple matter. It requires experience and a knowledge of the characteristics and capabilities of different grades. These characteristics are expressed in terms of commutation factor, frictional properties, polishing action, specific resistance, contact drop and flexural strength. In no two grades are all these properties identically combined. Fortunately, however, the brush manufacturer has learned how to combine various materials and processes so as to produce brush grades meeting a multitude of varying service requirements.



Aerofall product at minus 10 mesh goes to Humphreys spirals

A Progress Report on the Aerofall Mill

Results of a Year's "Break In" Under Production Conditions at Jones & Laughlin's Star Lake Operation

By R. G. FLECK and R. E. DUROCHER
Manager Assistant Manager
New York Ore Division
Jones & Laughlin Steel Corp.

JONES & LAUGHLIN first became interested in the Aerofall Mill in 1948 during the course of development of a process for treating the martite ore at Benson Mines. An 18-ton per hr pilot plant utilizing a rod mill for grinding and Humphreys spirals for concentration was already in operation. Because of the urgent need of a production martite concentration section, the investigation of the Aerofall Mill was not carried forward at that time.

The design of the first martite section along conventional lines was started in 1950. Construction of this unit took place in 1951 and operation commenced in 1952. The section included standard crushing and grinding machines and Humphreys spirals for concentration. It has given satisfactory performance since the beginning of operation.

Simultaneously with the construction of the conventional section, an investigation of the Aerofall Mill was carried out in a 5 ft x 2 ft pilot unit located at the Canadian Mines Branch Laboratory at Ottawa. Grinding tests were conducted aimed at a ten-mesh grind and containing a minimum of minus 100-mesh material. The ground product was subjected to batch and continuous Humphreys spiral concentration tests.

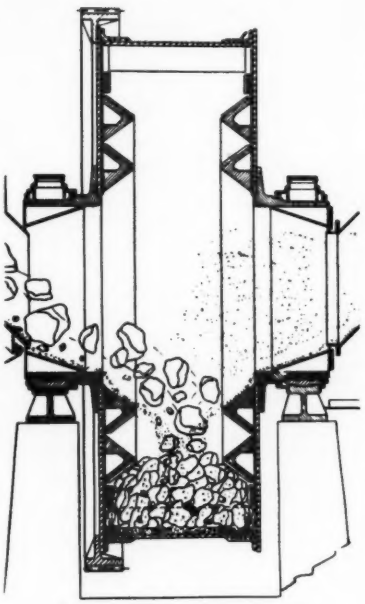
The results of the tests indicated favorable metallurgy because of the excellent liberation obtained of the iron minerals from the gangue.

Plant Design and Operation

Design of the second martite concentration section was started in 1953. The unit was designed to treat 100 long tons per hr of feed, utilizing a 17 ft x 5 ft Aerofall Mill for reduction of primary crusher product to minus ten-mesh for Humphreys spiral concentration. A flotation section was included for treatment of the minus 100-mesh fraction of the Aerofall product.

The Aerofall Mill is a dry, combined crushing and grinding unit employing air classification for removal of the ground product from the mill. It usually takes the discharge of a coarse crusher or run-of-mine material as feed and reduces it in a single operation to a fine size. Either the material itself is used as the total grinding charge or a small charge of balls may be added.

The mill installed at Benson Mines has an inside diameter of 17 ft and an inside length of 5 ft. It is driven by a 600 hp synchronous motor connected directly to the pinion shaft. Mill speed is 16.2 rpm or approximately 90 percent of critical.



Cross section of Aerofall Mill

The air system includes a 600 hp main fan, classifier, baffle separator, four 8-ft cyclones, wet venturi scrubber and a 50 hp bleed-off fan. The main fan has a capacity of 140,000 cfm at 27-in. water vacuum. The bleed-off fan delivers 10,000 cfm of air through the wet scrubber to the atmosphere. Its purpose is to compensate for leaks in the air system in order to maintain a slight negative pressure at the feed chute, and to remove moisture from the system.

Separation of the ground ore from the air is accomplished at four points, namely, (1) classifier bleed-off, (2) baffle separator, (3) cyclones, and (4) venturi scrubber.

Mill Charge

The ore being processed at Benson Mines contains about 23 percent iron present as a mixture of magnetite and hard black hematite, a mixture locally called martite. Gangue is principally feldspar.

The ore is crushed in a 54-in. gyratory crusher set at approximately eight in., and conveyed to storage silos. A six-in. grizzly sizes the feed for storage ahead of the Aerofall Mill. The plus and minus 6-in. feed is combined, in predetermined proportion, by vibrating feeders and carried by 42-in. belt conveyor to the mill. For our ore, the ratio of coarse ore to fine ore is not critical, the mill having been operated at various times on all fine ore, and at other times on 100 percent of coarse feed. A view of typical feed is shown in an accompanying illustration.

The feed rate to the mill is automatically controlled, through an electronic panel, by the load on the mill drive motor. At present the mill draws 420 hp, the main fan 340 hp and the exhaust fan 50 hp. The feed rate averages 135 long tons per hr. The average power consumption is approximately 4.5 kwh per ton.

Discharge Products

The size of product from the mill is controlled by mill load and air velocity through the system. Dampers in the fan suction ducts are controlled to regulate the air delivered to approximately 70,000 cfm. For our ore, it was found advantageous to remove product at the bottom of the air classifier and size this material on vibrating screens. The material removed at this point accounts for 80 percent of the feed.

The classifier bleed-off product is conveyed and distributed to three, 3-ft x 6-ft High Frequency Derrick Screens equipped with eight-mesh screen cloth. The oversize from the screens is conveyed to the feed end of the mill. It accounts for ten tph or a circulating load of approximately seven percent. The present high capacity of the unit is largely attributable to the closed-circuit arrangement.

The undersize from the screens and the discharges from the baffle separator, cyclones and venturi scrubber are collected in a tank where they are combined with water for pumping to the spiral concentrating plant which is located 1690 ft from the Aerofall plant.

Heat to Control Moisture

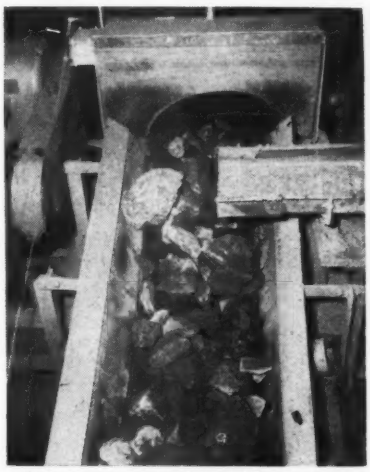
Moisture has a decided effect on the operation of the mill. With our feed rate, the mill can handle up to 1½ percent moisture in the feed without loss of capacity. Our ore normally is within the optimum moisture range, but at times will exceed this amount in the winter months.

The moisture handling capacity of the mill is largely dependent upon the temperature of the air system and the amount of bleed-off air exhausted. High temperature air will permit the handling of a higher moisture content in the feed.

In the winter months, in order to compensate for the low temperature of the feed ore, heat is introduced into the air system at the feed end of the mill. A 3,000,000 Btu per hr boiler provides steam to coils located in the air duct leading from the fan to the mill. Temperature of the recirculating air is maintained at approximately 120° F.

Liner Wear

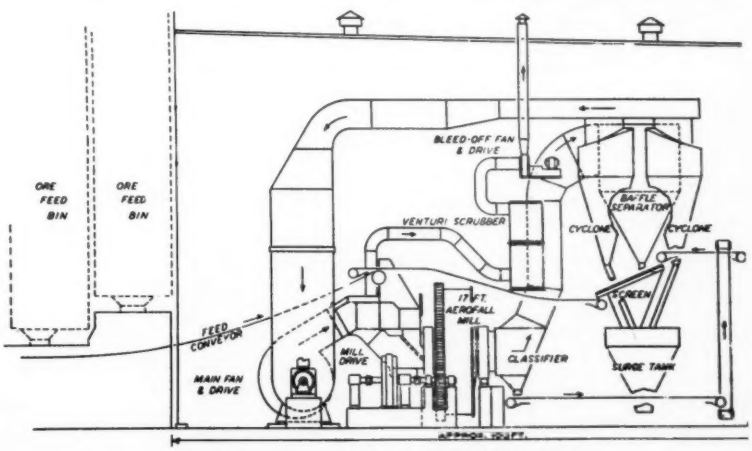
To date, approximately 575,000 long tons of ore have been processed in our mill. Total liner weight is 80,000 lb. Thus, if the liners were to be scrapped today, the liner consumption would amount to .14 lb per ton. It is expected that the present tonnage will be doubled before any liner replacement is undertaken.



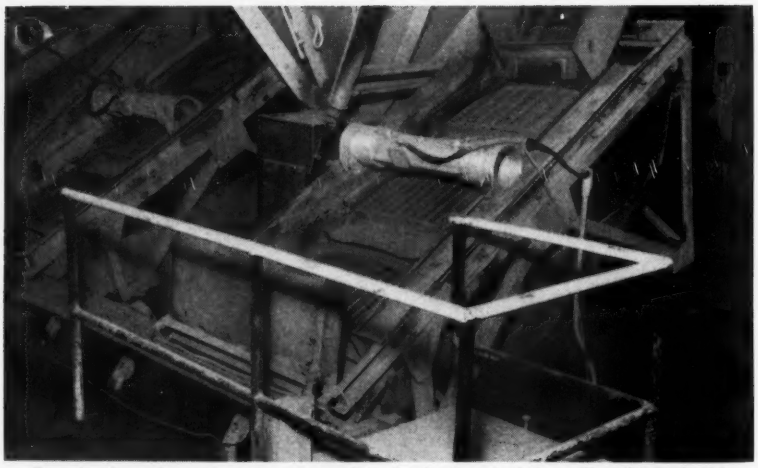
Mill charge comes from 54 in. gyratory crusher set at approximately 8 in.

Aerofall Improves Recovery

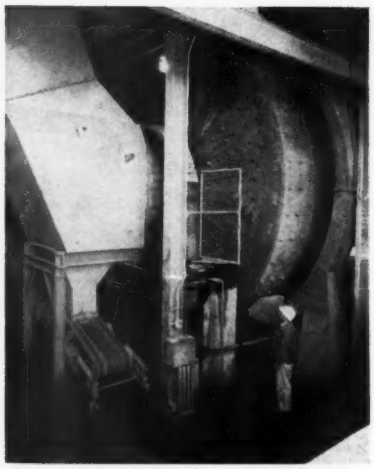
The concentration flowsheet employed at our operation involves three



General arrangement of 17 ft Aerofall Mill circuit



Oversize from the screens is conveyed to the feed end of the mill making closed circuit load of 7 percent



View showing classifier end of Aerofall Mill

stages of Humphreys spiral treatment. A classification and flotation section is installed for the purpose of improving iron recovery in the minus 100-mesh size range, but has not yet been placed into operation.

The spirals are treating minus eight-mesh Aerofall product containing about 21 percent of minus 100-mesh material. The spirals in the rod mill section treat a minus ten-mesh product containing 27 percent of minus 100-mesh material. Screen analyses of the two products are shown in Table I.

Present concentrating results using three stages of Humphreys Spirals on the above products give the results shown in Table II.

The results show equivalent concentrate grade for the two products, but superior recovery on the Aerofall product. The better recovery on the Aerofall grind is mainly attributable to the lower proportion of fines in the feed to the spirals.

The Aerofall Mill at Star Lake has been operated daily with variable operating conditions, for a period of one year. It was operated at times on all fine feed and at other times on all coarse feed. It operated with and without a ball charge and with non-uniform moisture content in the feed.

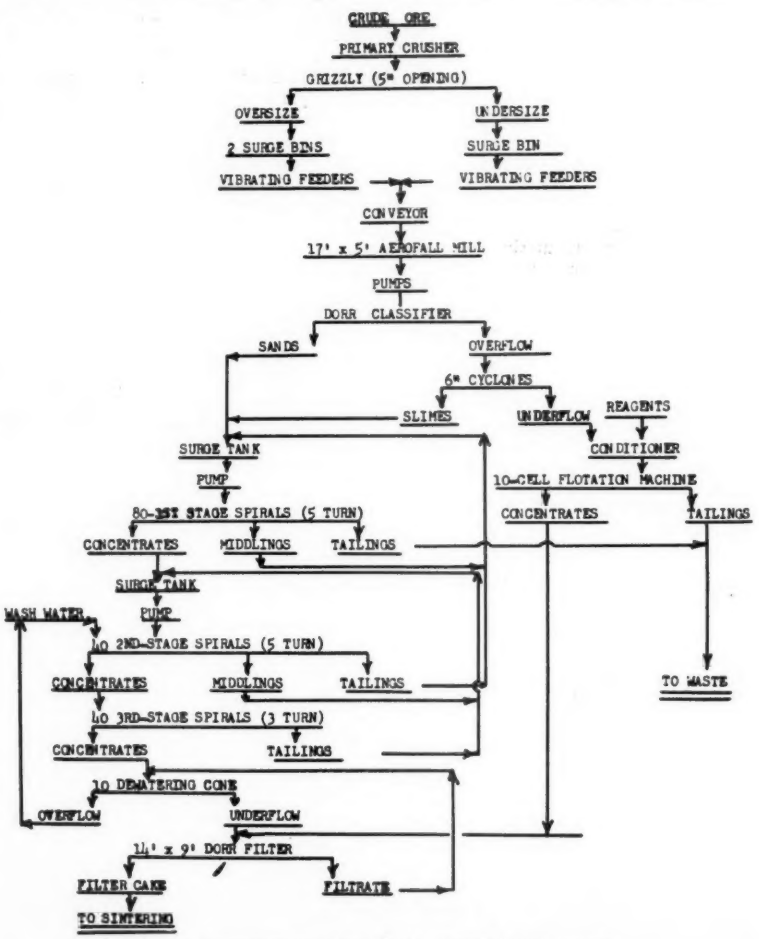
After this "breaking-in" period we feel we have a successful operation.

TABLE I—Screen Analysis

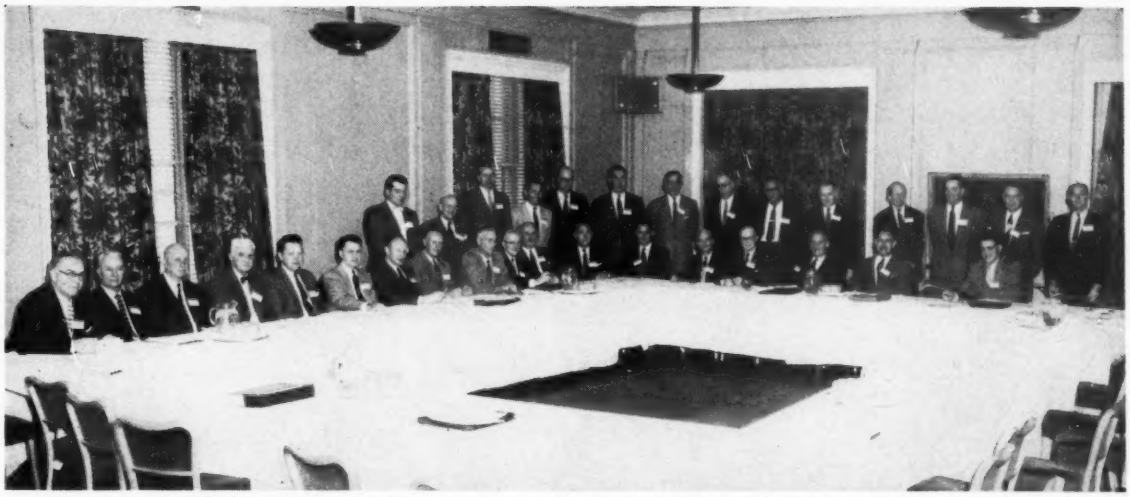
Mesh	*Rod Mill Product Cum % Wt*	*Aerofall Product Cum % Wt*
10	.2	3.7
14	1.0	7.0
20	10.2	22.2
28	22.6	35.9
35	37.2	49.4
48	51.4	62.2
65	63.5	72.0
100	73.5	79.4
150	80.6	85.5
200	85.5	89.4
-200	100.0	100.0

TABLE II

	Rod Mill Product % Fe	*Aerofall Product % Fe*
Head	24.40	24.30
Conc.	60.65	60.60
Tail	8.80	7.20
Recovery	74.78	79.86
Ratio of Conc.	3.32	3.12



Martite concentration flow sheet. Aerofall Mill section



Optimism in the industry's future was prevalent among Program Committee members

Coal Convention Program

National Committee Meets to Outline Program for 1956 Coal Convention of American Mining Congress

SELECTION of topics and speakers for the 1956 Coal Convention was the primary objective of the Program Committee that convened in Pittsburgh, November 17. This group had the responsibility of putting together the agenda for the convention, to be held in Cincinnati, May 7-9.

It was with a feeling of increased confidence in coal's future that the Program Committee met. The general sentiment was that the worst has passed and that it is more important than ever to concentrate on increasing efficiency within the industry. This is reflected in the master plan put together as shown below.

Suggestions for papers covering all phases of deep and strip mining, as well as coal preparation, were carefully reviewed by the committee before the program was drawn up. A primary source of convention topics was a compilation of questionnaires circulated throughout the industry, asking for topics of major importance to coal mining and the names of men qualified to discuss them.

For the Convention in May, two special luncheons have been arranged. On Monday a speaker familiar with both coal mining and the field of applied nuclear energy will discuss coal's future as it is affected by the atom. On Tuesday a widely known sports columnist will be heard.

In addition to the full days of technical meetings, the nights will be busy also. On Monday night a Coal Miners' party is scheduled. All who have attended this gala affair in the past know just what fun this festive event can be. Tuesday night will again be baseball night with two major league teams doing battle. A banquet is scheduled for Wednesday night as a fitting conclusion to an outstanding convention.

It is not too early to make arrangements for attending the Cincinnati meeting—which promises to be jam-packed full of vital information that progressive mining men can't afford to miss.

Outline of Sessions

MONDAY MORNING

Coal's Future

MONDAY AFTERNOON

A: Strip Mining
B: Maintenance

TUESDAY MORNING

A: Continuous Mining
B: Coal Preparation

TUESDAY AFTERNOON

A: Roof Support
B: Industrial Engineering and Cost Controls

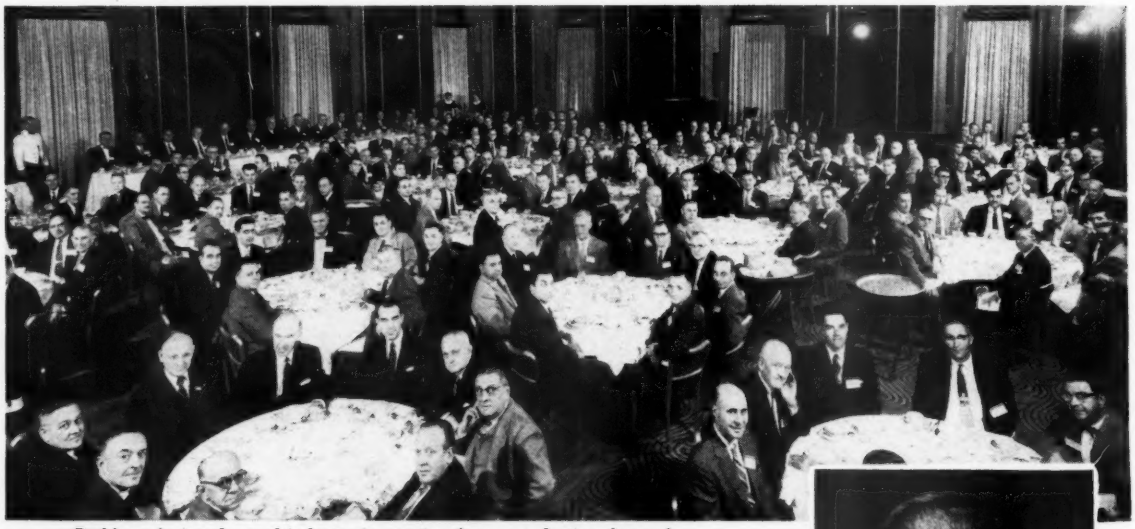
WEDNESDAY MORNING

A: Coal Preparation
B: Haulage and Power

WEDNESDAY AFTERNOON

A: Continuous Mining
B: Strip Mining

Coal Division Conference



Problems facing the coal industry in meeting future production demands were outlined at the luncheon

Committees Report Year's Progress At Annual Get-Together

THE Coal Division of the American Mining Congress held its Annual Conference at the William Penn Hotel in Pittsburgh on November 18. It was the twenty-first such conference and well over 250 representatives of mining companies and equipment manufacturers were in attendance to hear and discuss current technical problems of the industry.

All six committees, through 21 subcommittees, made reports on studies just completed or under way. The Rail Haulage, Conveyor Haulage, and Mechanical Mining Committees reported in the morning, while the Coal Preparation, Underground Power, and Roof Support Committees reported during the afternoon. Not only is the work being done in the several committees covered at these meetings, but the Conference is also a forum for an exchange of views on each study.

Committee membership is made up of operating men and manufacturers vitally interested in each phase of coal mining. All reports are planned with the original objectives of the Coal Division in mind—to present the facts concerning modern mining methods and equipment to the industry without recommendations or bias. In addition to the Annual Conference, each committee meets two or more times a year, with further subcommittee meetings as necessary. The primary purpose of the committee meeting is information that is constantly being gathered by letter and personal contact.

Luncheon Meeting

L. C. Campbell, vice-president, Eastern Gas & Fuel Associates, and Chairman of the AMC Coal Division, presided at a luncheon with over 250 in attendance. In a short address he stated that he felt very "bullish" about the future of the coal industry. He pointed out that the Cabinet and Congress had been made cognizant of coal's story and of the need to maintain a minimum annual output of 500,000,000 tons to provide an adequate mobilization base from which production could be expanded in the event of another national emergency. Campbell went on to pay homage to members of the various committees and subcommittees for their hard work in Coal Division activities.

J. W. Woomer was then introduced by Campbell as the featured luncheon speaker. Woomer, consulting engineer with offices in Pittsburgh and Wheeling, spoke on the subject "How Will Coal Mining Be Able to Meet Future Tonnage Demands?" He pointed out that with the anticipated increase of production over the next decade, the industry will face three problems—the need for technically trained manpower, higher capacity equipment, and additional coal areas. The expanding need for outside investment capital was also stressed by Woomer. He went on to say that in order to meet anticipated tonnage demands in the future, it is evident that production per employe must increase and that this will be done through further advances and developments in mechanized mining. This in turn, he pointed out, will greatly increase the demand for mining equipment and maintenance personnel. Ways and means of training this maintenance force will be one of the industry's important problems of the future, he stated.

L. C. CAMPBELL
Chairman
AMC Coal Division

At the conclusion of the luncheon, the Coal Division reports were resumed in the Monongahela Room. On the following pages, resumes of each of the committee studies are given. No report, as given at this meeting, is considered final. After the ideas and avenues of approach suggested in the discussion that followed these papers have been thoroughly explored, final reports setting forth the findings of the committees will be published.

CONVEYOR HAULAGE

Committee Chairman

H. A. JONES

MECHANICAL LOADING ONTO BRIDGE AND CHAIN CONVEYORS

VICTOR HURLEY, R. C. NELSON AND H. A. JONES

CONVEYOR haulage at the face has had its greatest development in low coal. Following are reports of how three companys are using conveyors behind mechanical loaders.

Mine A is a mechanical loading operation using bridge and chain conveyors which gather the coal to a belt conveyor. The seam mined is the Coalburg which ranges from 42 to 66 in. Immediate roof varies from a hard slate to sandstone. Generally, seam conditions are good. The mine runs from wet to dry but water is not a serious problem.

Panel entries are turned in sets of four and are driven 20 ft wide. Rooms are on 50-ft centers and are driven 40 ft wide. Two places are worked per setup. A loading machine equipped with a special boom loads the coal from the face onto a bridge conveyor, which passes it to chain conveyor which in turn discharges the coal onto a 30-in. belt.

The face crew is made up of six men; two load coal, set safety and road posts; two cut, drill and rockdust the face area; and two utility men extend chain conveyor, shoot and timber. Moving the conveyors is done on the third shift and takes five-man shifts. In entries, the peak tonnage with this crew and equipment has been 14 cuts or 350 tons of material. A reject of 10 to 12 percent leaves approximately 315 tons of clean coal for six face men or 52.5 tons per man shift.

Mine B is a mechanical loading operation using bridge and chain conveyors for service haulage from the face to the intermediate belt conveyor in the entry. The intermediate belt is 30 in. wide and operates at approximately 375 fpm. The bridge conveyor is 26 ft long and attaches directly to the end of the loading machine boom. The discharge end of the bridge is supported on the rolled-edge pan of the room conveyor into which it automatically loads.

The mine is in the Elkhorn No. 3 seam, which varies from 33 to 38 in. high. Top conditions are extremely bad, consisting of thin layers of shale and coal extending upward approximately 10 ft. In this roof wide haulageways for room transportation would be difficult to keep open. For this reason conveyors were selected for the room haulage.

Each working section consists of two places, either entries or rooms, using one loading machine. The gathering equipment for a two-room section consists of two bridge conveyors, and two-room conveyors, chain type, 420 ft long. Average production in wide rooms is about 200 tons per shift. Six men are employed for one production unit; one operator, one helper, one cutting machine runner, one helper, two utility men.

Mine C has 30-in. belt conveyors for main haulage which transport the coal approximately 2½ miles to the cleaning plant. Supply and personnel transportation are served by rail haulage from a portal approximately one mile fom the working area. This phase of the transportation is handled with battery locomotives and supply cars operating on 30-lb rail, which is kept advanced to the working sections.

The seam mined is the Powellton. A 36-in. section of high quality coal is underlain with about six in. of soft poor quality coal and this in turn is underlain with approximately three in. of soft fire clay. The roof requires close timbering even after the draw rock comes down. Due to the high ash coal at the bottom of the seam and the underlying fireclay, off-track haulage was not considered feasible at this operation. The close timbering required and the low height which did not permit thick cross-bars, were also factors to be considered if track haulage was used.

Chain conveyors have overcome, to some extent, problems of soft bottom and poor top. Shortwalls skidding over the floor, as well as the crawlers on the loading machine, cause an accumulation of dust in the working places. The loose combustible material which has been ground into dust is hauled to the outside when the conveyors are not used for transporting coal to the cleaning plant. Even with this objection, the advantage of this transportation system in overcoming the adverse mining problems encountered has been demonstrated.

This mine has been operating with belts and chain conveyors for approximately 15 years. Loading machines were installed about six years ago, and the mine has since produced 2,215,000 tons of coal. At the present time the production is 1250 tons per day. The total employment is 135 men.

RAIL HAULAGE

Committee Chairman

JAMES D. REILLY

MECHANICAL LOADING INTO MINE CARS

G. N. McCLELLAN AND J. D. REILLY

FOLLOWING are two case histories of mechanical loading into mine cars.

Mine A, located in Western Pennsylvania, uses all-rail haulage from the working face to the outside. Track-mounted machines load directly into 10-ton mine cars. The seam is the Pittsburgh, averaging about 90 in. thick and overlaid with 12 in. of draw slate which is mined and loaded with the coal. Adverse grades are not usually encountered but occasional local rolls and dips prove troublesome. The mine is fairly dry but water is encountered in some areas. Seam conditions have not determined or influenced the decision to use track haulage.

Mining is by the block system, retreating after the entry and rooms have been driven to the barrier limit. On the retreat, a section of 18 rooms constitutes a working panel. The haulage equipment for one section consists of an eight-ton trolley rail locomotive, with 40 mine cars assigned to a production unit. Average car change distance is 220 ft. A swing locomotive serves two panels.

The track for mining a complete panel requires 8500 ft of 40-lb rail; 3400 steel ties and 40 room turnouts complete with frogs and switches; about 95 percent of this material is recovered for re-use. For one production unit four trackmen are employed; other labor in the panel is not necessary because rail haulage is used. A unit produces an average shift tonnage of 360 tons; consisting of 277 tons of clean coal and 83 tons of refuse.

Mine B, located in Eastern Ohio, is fully mechanized, using track-mounted cutting machines, track-mounted loading machines, track-mounted drills and timbering machines and 10-ton capacity steel mine cars. The mine cars are loaded by the machine at the working face, and hauled to the tipple by locomotives, where they dump automatically without uncoupling. The seam mined is the Pittsburgh or No. 8, which averages about 54 in. thick. A 12 to 14-in. drawslate falls when the coal is shot, and must either be loaded out or gobbed in the mine. Due to the mine being extremely wet with the resultant soft bottom, and due to roof conditions, track haulage is considered best for this property.

Rooms are worked in blocks of five, with each block comprising the territory for one production unit. Coal is hauled by an eight-ton cable-reel locomotive from the face to the intermediate sidetrack located in the entry; from there a 13-ton relay motor takes trips to the main line. Maximum length of the service haul is 4000 ft from the room face to the entry side-track.

Twelve mine cars are assigned to a production unit. A total of 2500 ft of 40-lb rail; 830 steel ties and eight room turn-outs, complete with frogs and switches, are used for mining one block of five rooms; 95 percent of the track material is recovered for re-use. A unit produces an average shift tonnage of 550 tons, consisting of 350 tons of clean coal and 200 tons of reject.

MAIN LINE TRANSPORTATION WITH MINE CARS

R. D. FLOWERS

FOLLOWING are two examples of main line locomotive, hauling non-stop trips from shuttle car loading station in the working section to the tipple. No intermediate haulage is used.

Mine A has four producing sections in 34-in. coal, each section averages 165 tons r.o.m coal per shift. Loading is from shuttle cars into elevator and elevator into mine car. Mine cars average 6.5 tons clean coal and 7.0 tons r.o.m. Nine-car trips are pulled with two six-ton locomotives in tandem. The locomotive is equipped with trolley phone and the section foreman has both trolley phone and telephone at loading place so he can talk to motorman and dump operator. Maximum haul at present time is 6000 ft one way. One two-man train crew hauls all coal produced in four sections. Supplies are hauled on special supply cars which are placed on the section. Men are hauled on special mantrip cars.

Mine B has produced 1000 tons per shift from four loading sections in 42-in. coal. Loading is from shuttle car into elevator and elevator into mine car. Mine cars are pulled in 15-car trips with two six-ton locomotives in tandem and a two-man crew. Maximum haul is 3½ miles one way on grades up to 3½ percent which requires skids under mine car wheels. The loaded trip is dumped upon arrival at tipple and cars are returned to mine without uncoupling. Four men and two tandem locomotive units haul all coal, supplies, and men into and out of mine. Mine car load averages eight to nine tons per car.

CONSTRUCTION AND MAINTENANCE OF MAIN HAULAGE ROADS IN COAL MINES

(Revision of Booklet)

H. O. ZIMMERMAN

THE first edition of the "Haulage Roads Booklet" was published in 1932 under the title, "American Recommended Practice for Frogs, Switches and Turnouts for Coal Mining Tracks." Following the original publication there have been subsequent editions in 1934, 1935, 1936, 1939 and 1945, each one adding some material. The last publication was in 1945 and since that time trends in coal mining toward larger capacities and higher tonnages have brought about new practices and some changes in equipment. Therefore, it is advisable to revise the 1945 specifications to conform with present haulage practices and to anticipate further trends.

The revisions have been carefully considered by a subcommittee consisting of H. O. Zimmerman, W. F. Diamond, Paul M. Gift, W. G. Protzman, W. F. Robinson, and E. E. Roecker. The following progress is reported:

(1) Complete and detailed specifications for main haulage wood mine ties have been prepared.
(2) Turnout data have been prepared for 42-in. and 44-in. track gage for rail weights up to 60 lb.
(3) Four drawings with data on bolted and cast steel frogs for 70 to 100-lb rail have been submitted.
(4) A drawing has been made covering guard rails for rails from 20 to 100 lb.
(5) The tabulation of safe rolling loads on rails has been revised to incorporate rails from 70 to 100 lb.

The revised booklet will omit all data for track of 30-in. gage which is rarely used in coal mines today but will include data for track of 44-in. gage which is not included in the present booklet. This will require many additional drawings of tie layouts, turnouts, and crossovers incorporating track of 44-in. gage and rail weights from 70 to 100 lb.

MECHANICAL MINING

Committee Chairman
WM. E. HESS

FACE TRANSPORTATION FROM CONVENTIONAL LOADERS

STEPHEN KRICKOVIC

WE all know that the present continuous mining machines are not economically applicable to all mining conditions, that large scale conversion to continuous mining will require considerable time and that conventional equipment, therefore, is to stay with us long enough to deserve more attention than it has ever received. It is with this thought that the Committees on Mechanical Mining, Conveyor Haulage and Track Haulage undertook the task of obtaining, studying and reporting on the various methods of face transportation actually in use with conventional loaders. The purpose of each report is to present the important physical conditions, the equipment and the plan of mining used and the results obtained, which all can be a possible guide for improvement. Essential facts from each report are summarized as follows:

In all the thin seams reported, crawler-mounted loaders are used under tops that vary from good to bad and on bottoms that range from firm fireclays to soft fireclays and shales which soften when wet. It is correct to say that bolting has revolutionized mining in the thinner seams by making practical the use of crawler-mounted loaders, bridge conveyors and shuttle cars.

In the thinner seams the number of working places per loader generally is small, two to four. These places, however, vary from 16 to 28 ft wide in the headings and 35 to 40 ft in rooms. It is this extra width, compared to the 13 to 24 ft width in the gaseous Pittsburgh seam, that provides some compensation for the few places. By contrast, mines in the Pittsburgh seam have from seven to 18 working places per loader.

In shuttle car operation, the two very important factors are short distances from the faces to the unloading point and the availability of two separate travelways between the working faces and the unloading point. This means that particular care should be exercised in designing a plan that allows belt conveyor or mine car loading stations to be moved at relatively short intervals.

Bridge conveyors, chain conveyors and room heading belt conveyors comprise an effective and practical method of continuous face transportation. While the use of these facilities is not necessarily determined by the top and bottom conditions, weak tops and soft bottoms are good reasons for considering conveyors to permit closer timbering outby the face.

INDUSTRIAL ENGINEERING

E. B. LEISENRING, JR.

INDUSTRIAL engineering, applied to coal mining, is based on the premise that all cost can be controlled, that the only way to control the total cost is to control each element of expense, and that these elements are to be controlled at their point of origin. The use of the stop-watch to measure the work-elements, and the use of graphs drawn from the stop-watch findings are the basis of most industrial engineering programs. The steps for introducing an industrial engineering program are as follows:

1. *Selection of personnel to inaugurate the program.* Industrial engineering programs have been highly and successfully developed in other industries, which, in almost every case, have had far fewer variables to deal with than has coal mining. Therefore to use the services of specialists already having the experience of industrial engineers and applying it to coal mining seems the most effective and economical approach to the problem.

2. *Indoctrination of top management.* Top management from president through superintendents must be sold on the value and workability of the systems by a thorough knowledge of its mechanics.

3. *Training of supervisory force.* Each general mine foreman and section foreman must go through a one to three-week training program in the use of the stop-watch in conjunction with the charts and graphs which are drawn up from the work element data collected by stop-watch. This is to acquaint him with the workings of the program and to cement his confidence in the program.

4. *Achievement of balanced face cycle, and controlled maintenance* are accomplished by selection and rearrangement of work-elements. From several different methods of performing each work element, that method is selected for each element which accomplishes the necessary task in the most economical manner (usually the least elapsed time). Then these selected methods are rearranged so that the least time is spent by crew members in unproductive work or no work.

5. *Production incentives.* Many different forms have been experimented with and used in coal mining. It is believed that per ton incentives, for foremen and for men, based on timed work-elements, under varying conditions, are most equitable and therefore more satisfactory than incentives based on any less detailed measurement.

DUST CONTROL FOR CONTINUOUS MINING

J. A. YOUNKINS

IN September 1954 the Committee issued a preliminary report on Exhaust Dust Collection for Continuous Mining which described an installation comprising a small exhaust fan to exhaust air from the working place through 24-in. tubing, discharging directly into the section return through a fly curtain so designed as to prevent recirculation of air. A second installation has been in operation about six months using a higher capacity fan with noticeable improvement in both ventilation and dust condition at the face.

This improvement was due in part to increased quantity of air passing over the miner and in part to a change in water spray application. The change increased the production of mist or fog considerably, noticeably reduced the amount of air borne dust picked up by the air current and discharged through the fan and changed the condition of the coal discharged from the miner from wet to just damp.

The subcommittee decided that a great deal might be learned by studying spray applications being used at the present time. A field data observation sheet was devised but to date, insufficient data have been received to warrant a comprehensive report. However, the few reports received indicate that good face visibility and adequate dust suppression are possible when the face area being mined by the continuous machine is reasonably well shrouded with mist or fog from well designed and properly placed water spray nozzles. It is the purpose of the subcommittee to report in detail on operations achieving good results with water spray, giving engineering data on the spray applications, placement of the sprays on the machine and other pertinent data to enable these installations to be duplicated by those who may wish to do so.

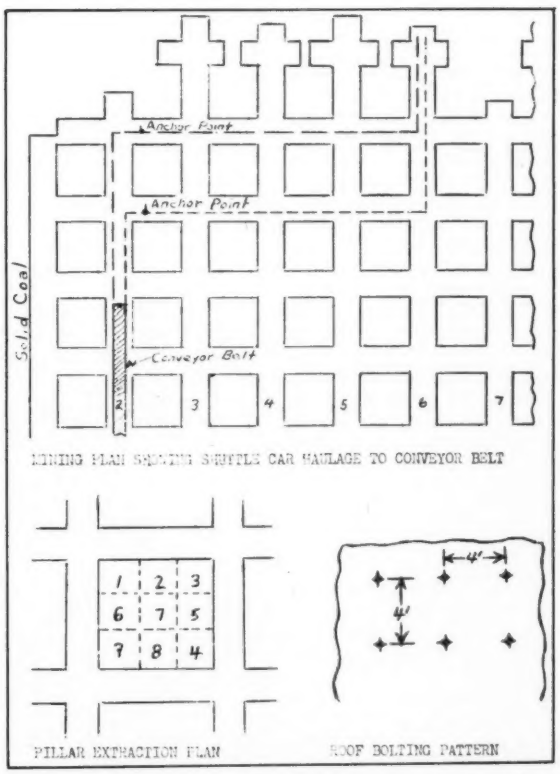
MECHANICAL LOADING INTO SHUTTLE CARS

LARRY GENT

THIS report covers a mine in the Pittsburgh Seam in northern West Virginia. The seam in general is level and the mine is relatively dry. Numerous clay intrusions are encountered. Immediate roof is a hard grey shale ranging from 18 to 24 in. in thickness. It is covered by a massive formation of sandstone and shale ranging from 0 to 350 ft in thickness. The bottom is made up of a hard fireclay approximately two in. thick; under this formation is a very soft fireclay that causes considerable trouble if wet conditions are found.

Conventional room and pillar mining is used. The crawler mounted mechanical loader discharges into shuttle cars which dump onto a 30-in. panel belt which is extended by a specially trained crew on the third shift. This belt loads onto a 36-in. main haulage belt that takes the coal to the outside. Two shuttle cars are used on each section, these are of the cable reel type, rubber tired, and have a capacity of six tons.

An 11-man section crew is used. The loader is oper-



Plan of mining at one mine using shuttle cars for service haulage

ating at the face approximately 85 percent of its available operating time. The average shuttle car change time is one minute for the longest haul of 420 ft and 15 seconds for the shortest haul of 120 ft. The average production on the section is 550 tons per shift and the total production of the mine 3500 tons per shift.

COAL PREPARATION

Committee Chairman
R. L. LLEWELLYN

MAINTENANCE OF MECHANICAL DRYING EQUIPMENT

JACK BISHOP

A SUBCOMMITTEE has been set up within the Committee on Coal Preparation to investigate maintenance practices on several types of cleaning equipment. The first piece of equipment in the cleaning plant to come under the study of the subcommittee is mechanical drying equipment. Following are case histories from four operations.

Mine A operates ten mechanical drying units with approximately 45 tph of ⅜-in. by 0 coal being fed to each unit. Moisture content of the feed varies from 27 to 29 percent and the product contains from 8 to 8½ percent moisture. The company reports that a complete set of 24 screens per unit will last 60 days, or 870 operating hours, without any maintenance other than cleaning and checking every day. After that time attention has to be given to patching holes in the screens. A spare machine is kept on line for emergencies. Major item of delay time on a unit is caused by oversized coal, which may come from leaky screens or other sources, that plug the dryer. A completely built up spider or spinner is installed every 45 operating days and is replaced approximately 14 months later.

Mine B. At this operation 60 to 65 tph of minus 5/16-in. Pittsburgh coal are fed to each mechanical dryer. Moisture content of the feed varies between 16 and 18 percent with the product containing 6.5 percent. An average of 15 hours monthly is spent for maintenance on each unit. The company reports a screen life of 50 hours and does not have a spare machine. No major down time is reported except to change a roter and wear plates about once a year.

About every 3½ years the dryers are given a major overhauling. Four years ago the company installed vibrating feeders to the drying units. These give an even feed and the company reports that major repairs to the mechanical drying units has been reduced by one half.

Mine C. From 25 to 40 tph of minus 5/16-in. Pittsburgh coal are fed to each of the mechanical dryers. Moisture content of the feed varies from 15 to 20 percent and the average content of the product is 10.4 percent. From 12 to 15 hours each month are spent for maintenance on each dryer. The company reports a screen life of from 125 to 150 hours (4800 tons) and a basket life of two years. Major items of delay time are caused by changing screens and ribs.

As part of the maintenance program, each dryer is taken out of service at regular intervals and baskets rebuilt and all worn parts changed or repaired.

Mine D. Approximately 60 tph of 9-mesh by 0 coal are fed to each dryer at this plant. Moisture content of the feed is 40 percent and moisture content of the product is 12.5 percent. A screw life of 1150 hours is reported and there is no delay time other than replacing screws at the end of that period. As part of the maintenance program, mechanical drying equipment is completely checked and overhauled every three months.

WASHERY WATER CLARIFICATION

A. G. GILBERT

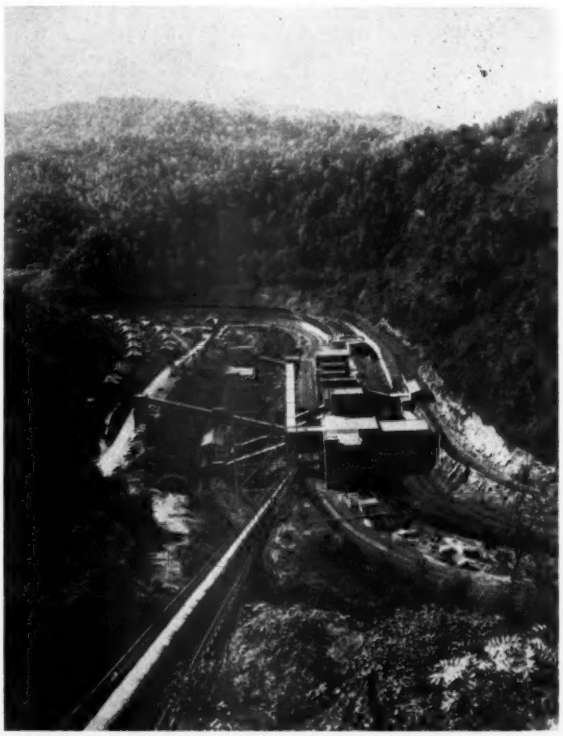
THE problems of washery water clarification are many and varied. After much discussion the subcommittee on Washery Water Clarification has concluded that the proper way for the group to function is to first gather as much basic information on the subject as they can. As a start in this direction a questionnaire has been given limited circulation in the industry to find out how and why the industry is handling the problem.

Following are five case histories gathered from preparation plants in the Central Appalachian area.

Mine A. The water clarification system at this property consists of one 175-ft thickener, five 14-in. cyclone thickeners, 110 three-in. cyclone thickeners, one 12-disc vacuum filter and two 4-disc vacuum filters and two settling ponds. The plant is a hydro and hydrotator type and it is very important to keep the solids content of the circulating water constant, preferably around 15 percent, as these solids are used as a media. When there is a solids building up of over 15 percent, circulating water is pumped to one of the settling ponds at the rate of 300 gpm for 15 to 20 minutes. This is done on the average of twice a shift. None of the coal is being wasted as all solids are recovered from the settling ponds.

Mine B. At this plant cyclones and vacuum filters are used in the preparation plant to retain solids and approximately 30 acres of settling ponds are used to clarify water from the refuse circuit. Three reasons are listed for clarifying plant water; to retain as much useable water in the plant as is possible; to retain part of the solids, that which is low in ash content; and to conform with stream pollution specifications. The company reports that it would like to recover 50 percent of the solids in the washery water and feels that this is the amount that can be recovered economically.

Mine C. A 125-ft thickener is used to clarify recirculating water and a settling pond to clarify waste water



Some cleaning plants are located in areas that do not lend themselves to large settling ponds

at this plant. There is a scarcity of water for the plant, but water is also clarified to prevent a build-up of solids in the system. Coal fines are recovered and none of the coal is being wasted.

Mine D. A need to conserve water and to avoid stream pollution are primary reasons for water clarification at this cleaning plant. In addition, there is a need to clarify plant water to prevent build-up of solids in the system. A settling tank is used for washery water clarification.

The company would like to recover 35 percent of the solids in the washery water and feels that this is the amount that can be economically recovered.

Mine E. Clarified water from the constant head cone is used on the sprays to rinse coal at the primary heavy-medium vessels and the secondary heavy-medium vessels. This water then passes to the new coal drag tank and the overflow is pumped to the resettling water constant head tank. Clarified water from the constant head cone is also used as vertical water for the refuse boxes at the fine coal launders. This water is then passed to the reject drag tank and the overflow is either pumped to the 150 ft thickener feed sluiceway or to the clarified water head cone.

Recirculating water used as push water at the fine coal launders passes to the fine coal boots. Overflow from the boots is pumped to 14-in. cyclones and the overflow from the cyclones goes to the 150-ft thickener sluiceway. Underflow from the cyclone goes to the vacuum filter vat. The 150-ft thickener underflow is pumped to the vacuum filter, and the overflow is used as clarified water to the clarified constant head tank. A portion of the 150-ft thickener overflow is pumped to the 85-ft thickener, where a flocculent is added to the feed.

The company is not faced with a scarcity of water, but does have to comply with stream pollution laws. The cleaning plant water is clarified to get the highest possible quantative return and at the same time produce an acceptable product. An attempt is made to hold solids in the recirculating water to a maximum of five percent. Ninety percent of the minus 325-mesh material is being wasted. This is approximately 1½ percent of the raw coal feed. It is felt that complete recovery of solids in the washery water at present would require the addition of flotation cells, heat drying and filters.

UNDERGROUND POWER

Committee Chairman
JOHN A. DUNN

TRAILING CABLES UNDERGROUND

C. O. WOOD

PRACTICALLY all face equipment in our coal mines receives power by means of some sort of portable conductors, commonly termed "trailing cables." In order to minimize manual labor at the face it is general practice to keep these trailing cables as small and light as possible. This practice is as it should be, but there are certain limits beyond which we dare not go without sacrificing performance of face equipment. When trailing cables are not large enough, they will get hot causing rapid deterioration to their insulation; and excessive voltage drop will result in loss of performance in the equipment being powered through the cable. When trailing cables are of proper cross-section to prevent overheating but are too long, the operator may expect excessive voltage drop.

When selecting a trailing cable for use on a given piece of face equipment, the first general specification which is usually decided upon is cross sectional area. This selection is based upon the proposed load or amperage which must be carried and the ability of the cable to carry that load without overheating. General accepted practice by cable manufacturers is that 60°C should be the top temperature of rubber insulated cables, or for cables having rubber substitutes for their outer sheaths.

The next question which arises is, "How can we tell how much current a cable will carry without exceeding this 60°C temperature?" This depends on many circumstances, a few of which are. (1) Will this cable lay on the bottom along the rib? (2) Will excess cable be piled in a cross cut? (3) Will the excess cable be layer-wound on a reel?

After having considered all of the above points and finally selecting a trailing cable for a particular application it sometimes happens that the machine does not perform properly. In order for an electric motor to perform at peak efficiency it must operate at rated voltage. A drop in voltage on a series wound d-c motor will result in a drop in speed which is slightly greater than the percentage voltage drop. If it is a shunt motor, a severe speed drop may not be as evident as an increase in armature current. This will cause the motor to run hot and the increased load will cause the voltage to drop even lower. On a-c equipment conditions exist which are much worse than on d-c. Torque of an a-c motor is considered to vary in proportion to the square of the voltage. Thus an a-c motor will produce only ¼ of its rated torque if it operates on ½ voltage.

In order to give a clearer picture of this voltage situation the report submits a curve sheet showing voltage drops on two conductor trailing cables, 500 ft in length, when operating at 60°C.

TEMPORARY CABLE SPLICES

T. R. WEICHEL

THE work of this Task Group is to obtain information about the various methods for making temporary splices in trailing cables. Considerable difficulty has been experienced with temporary splices in trailing cables because of the method of construction and the type of material used in making the splice. From information obtained to date, the committee can offer some basic recommendations as a pattern to be followed in obtaining the most desirable type of temporary splice.

A suitable cutting tool is desired that will permit easy cutting and removal of the conductor insulation and cable sheath. This tool should remove the insulation from the conductor sufficiently to permit installation of the conductor splicer. It should also remove the sheath for a sufficient distance to permit splicing of adjacent conductors of the cables having more than one conductor. Greatest need for such a tool is in splicing of Twin Type W and G Trailing Cables.

Possibly some improvement can be made in the type of splicer sleeve now available to the industry. Most of the present sleeves produce a larger conductor splice because a heavy wall is necessary to permit good electrical conductivity and mechanical strength. Possibly this type connector could be reduced in size and still retain the desirable electrical and mechanical characteristics. This is a problem for consideration by the connector manufacturer.

Insulating and jacketing tapes are applied to a thickness equal to the original walls. It is possible some improvement can be made in insulating and sheath material permitting reduced walls. This will permit completion of the splice to the original cable diameter when sleeve type splicer is used. This phase of the project will also be considered by the cable committee and recommendations included in the final draft.

This problem has been under consideration by the Power Committee for some time and before a final draft

can be submitted on the project, additional experimental work will be required. Performance on several types of sleeve connectors must be obtained. The possibility of developing a butt-weld device for use inside the mine must also be considered. We hope to have a final report complete for presentation at the spring meeting 1956.

PERMISSIBILITY PROBLEMS

J. A. BUSS

IN the past half century there has been steady progress in the development of practical and workable standards for the design, use, and methods of responsible approval of electric motor-driven mine machinery. Changes and improvements have resulted from the U. S. Bureau of Mine's research programs, technological developments of machinery manufacturers, from changing conditions in the mining industry, and from countrywide economic and sociological growth. Progress has not always been easy, but in the long run the Bureau has found that all of the interested groups, labor, the operators, and the machinery manufacturers, have been ready to cooperate and compromise as soon as a clear cut understanding of the needs and the implications of the changes have been developed.

The changing pattern of the last decade and a half now is causing another look to be taken at the standards, and, as a result, the U. S. Bureau of Mines' Schedule 2F has become the law under which we are designing, applying, and using permissible equipment. As officially published, the schedule contains a number of points which fall short of the desired level of safety, equity, and practicability. It is widely recognized that it must be amended to rectify these shortcomings but there is agreement that amendment is best delayed for perhaps a year in order to obtain experience with its operation and develop solutions to its problems.

In writing a new standard of this type it is natural that new factors are subject to widespread misunderstanding and difference of opinion, and this will result in many difficulties in its administration. Our Committee on Underground Power is soliciting comments from interested individuals and groups in an effort to develop a knowledge and understanding that will form the basis of a program of amendments which will provide the industry with a standard that is of maximum safety, and at the same time, equitable and workable.

MINE LIGHTING

S. P. CARTER

IN March 1953 the Mining Development Committee of Bituminous Coal Research, Inc., was authorized to conduct a Mine Illumination Project. The purpose of this project was to determine the feasibility and practicability of lighting the active working area of a conventional production section of a coal mine. This project received assistance from several leading industrial companies outside of the coal industry.

The first four months of the study on this project were spent in experimenting with several different types of fixtures and systems of lighting. At the suggestion of the United States Bureau of Mines, it was decided to try a 12-in. fluorescent circline fixture. The circline fixture was first operated from the d-c mine power supply, and the same difficulties were encountered with the circline fixture as were encountered with the 48-in. straight tube, namely, excessive heat, blackening of the fluorescent tube, and excessive maintenance. It was decided that a-c power supply was required in order to operate the fluorescent circline tubes satisfactorily.

In July 1954 this lighting system was installed in the Dorothy Mine of Armco Steel Corp. at Montcoal, W. Va., and has been in continuous operation on the same section in this mine for a period of 16 months.

The purpose of the Montcoal installation was to try to evaluate the system to determine some of the advantages of lighting a section of a mine. There has not been any attempt to measure the production of the lighted section against the production of a non-lighted section due to the number of variables that exist between any two sections in the same mine. Production from the lighted section has been excellent in comparison with the other sections of this mine, and at times the physical condition on the lighted section have been far worse than they were on the other sections. Some of the advantages gained are: (1) A more desirable working place, (2) better housekeeping, (3) fewer accidents, (4) better morale, (5) reduction in the loss of material and supplies, (6) less workmen fatigue, (7) improved supervision, (8) less abuse of equipment.

Most of the things just enumerated are intangible items of production which are difficult to measure, yet they are recognized as being an integral part of any industrial process which has as its goal increased production and lowered costs.

ROOF ACTION

Committee Chairman

C. O. KANE

MAINTENANCE TRAINING FOR ROOF BOLTING

ORVAL ROBSON, E. M. PACE AND J. ROBERT FLETCHER

A GOOD maintenance program and a operator training program are mandatory to get the utmost out of roof bolting. Here is what three companies do to protect their investment in equipment.

Mine A is in the Pittsburgh No. 8 seam which averages 6½ ft in thickness. The bottom is a soft fireclay. The top varies considerably throughout the mine, but most of the immediate top is typical drawslate a foot thick. For about ten ft above the drawslate various roof structures exist.

During the past year 100,000 roof bolts have been installed. Rotary drills are used throughout at the present time on the producing sections. These are equipped to provide thrusts up to 5000 lb and speeds varying anywhere from 0 to 400 rpm. Where the drilling is soft, high speed and low pressure are used. Where hard sandstones occur, the speed is reduced and maximum thrust is employed.

To maintain a low bit cost it is necessary to provide a system of bit supply whereby each driller can be checked. Two boxes of bits are provided for each driller. One is for use while the other is in the shop where the bits are sharpened. A record of the number of bits reground and the number of replacement bits needed is kept by the man who does the grinding.

While the operation of the drills is relatively simple, there are certain fundamentals about the machine and the bolting process that must be learned before putting a new man on a drill. To provide this training a new man is given several days with an experienced driller before he is asked to operate a drill by himself. (The drilling in each section is done by one man.) Then he is given the drill and with some coaching by the foreman he is able to do the work and soon becomes a capable operator.

It should be noted that the bit cost became excessive when trying to drill certain sandrock formations dry. It was decided to equip the drills on these sections with water tanks and pumps to force water up through a hollow hex steel drill section to the bit. This practice

proved successful and the benefits have been twofold; it made rotary drilling of sandrock feasible, and it eliminated the need of a dust collector.

Mine B is in southwestern Virginia operating in the Imboden seam. Coal averages 78 in. thick. Twenty-five percent of the roof drilling is done in massive sandstone, the remainder in shale and sandstone laminations. At the present time, ⅝-in. bolts made of 1040 steel are being used.

Bit cost is high because of the hard sandstone that has to be drilled. The care and handling of bits is satisfactory. Bits are brought outside at the proper stage of dullness and corners are not allowed to be worn excessively. Each driller has his own string of bits. He carries them in and out each day. Dull bits are sharpened and destroyed bits replaced and a record is kept on each driller's bit cost.

All drill men are carefully trained as helpers before being put on as operators and are carefully selected for the job. The maintenance program calls for a regular program of drill inspection and lubrication and any necessary repairs are to be taken care of immediately upon detection.

Mine C, in eastern Kentucky, sets approximately 15,000 bolts per month. This represents an expenditure for materials and labor of well over $15,000 per month and it was thought advisable to set up an education and control program with an engineer in charge. The program was established as being a part-time job for the engineer, and is specifically his responsibility. He spends one or two days a week on the bolting program and reports directly to the mine superintendent.

Bit condition is considered a critical item and is closely watched by the engineer. Drilling with dull bits results in overheating the bit and puts excessive strain on the bolting machine clutch, gears and motor. Special adapters are used on some of the rotary machines to reduce the drilling speed when sandstone is encountered.

Each shift has two strings for bits, one for sharp and one for dull bits. At the beginning of a shift, the sharp bit string normally has from six to 12 bits. As these become dull, they are placed on the dull bit string and taken out to the mine shop to be sharpened. Bit sharpening is by specially trained men in the shop. This operation is also considered a critical item since the way a bit is sharpened has a bearing on how well it cuts and how long it will last. In the mine, a hole gage is used to check the diameter of the hole at the back.

The company feels that its education and control program, with an engineer in charge, is meeting the training needs of its personnel in that bolting practices have been greatly improved since the program was started. The program will continue in much the same manner as described above, with the expectation that as training improves the bolting work being done, the engineer will have to spend less time in checking results and training personnel.

TORQUE REQUIREMENTS FOR ⅝-INCH ROOF BOLTS

A. J. BARRY AND J. A. McCORMICK

A RECENT trend in the mining industry is toward ⅝-in. diameter, headed, expansion-type roof bolts to control mine roof in place of either one-in. slotted-type bolts or ¾-in. headed expansion-type bolts. Although a limited amount of information has been collected by fabricators of the ⅝-in. bolts, there is no published information regarding the torque requirements.

Numerous tests using ¾-in. bolts showed that the torque-tension relationship was approximately 40 lb of load for each foot-pound of torque applied. These tests also showed that if torques greater than 200 ft-lb were applied to the bolt, it tended to become permanently deformed, despite the fact that the yield load in pure tension had not been reached. With advent of the ⅝-in. bolt, an investigation was made (1) to determine the torque-tension relationship and (2) to determine the amount of torque that can be applied to either of these bolt types with reasonable assurance that the bolts will not be permanently deformed in any way.

The torque-tension relationship was found to be approximately 50 lb of load per foot-pound of torque for both regular and high-strength bolts. This relationship is valid up to and including 130 ft-lb for the regular bolts and 175 ft-lb for the high-strength bolts. As previously stated, above these values the relationship was very erratic.

To be reasonably sure that ⅝-in. bolts are not permanently deformed when they are installed, the torque on a regular bolt should not exceed 130 ft-lb, and the torque on a high-strength bolt should not exceed 175 ft-lb. These limitations are of added importance in view of the fact that, in many instances, the mines adopting the ⅝-in. bolts are using the same high-powered equipment for tightening the bolts as for tightening ¾ in. and one in. diameter bolts. For this reason, it is not unreasonable to assume that many regular bolts now in use are being permanently deformed when they are installed. From a safety standpoint, if this is true and the bolts are being employed to build a series of thin layers of roof into a beam, the installation will be potentially dangerous. If the bolts are being used to suspend a series of thin beds from a thicker bed, the installation may not be dangerous, but the amount of support provided for the roof will be decreased owing to weakening of the bolt.

GEOLOGICAL STUDY ON MINE ROOF STRATA

C. T. HOLLAND

THIS complete report is scheduled for publication in the January 1956 issue of MINING CONGRESS JOURNAL.

TENTATIVE ROOF BOLT SPECIFICATIONS

G. P. MAHOOD

A TASK group of the Committee on Roof Action has been investigating the possibility of establishing specifications covering bolt steel, expansion shells, wedges, roof plates, angle washers, ties and channels.

These tentative recommendations are proposed for two primary purposes:

(1) To protect the consumer by assuring that roof bolting materials shall be made in accordance with certain specifications pertaining to quality and minimum dimensions.

(2) To establish certain manufacturing practices to provide a uniformity of product without suppressing improvements in design and advancements in engineering.

At a meeting of roof bolt manufacturers prior to the Conference, recommended roof bolt specifications were discussed and outlined. These completed and revised specifications were presented to the Conference. A few minor points remain to be covered after which the report will be submitted to the industry for comment or approval. This will be done through publication in MINING CONGRESS JOURNAL. Following receipt of any comments, final review of the recommendations will be made by the Roof Committee as a whole at its next meeting.

Wheels of GOVERNMENT

As Viewed by HARRY L. MOFFETT of the American Mining Congress

PRESIDENT EISENHOWER, at his temporary headquarters in Gettysburg, Pa., is putting finishing touches on messages to be sent to Congress in January, outlining the Administration's legislative program and budget requirements for the coming year. Administration leaders have been shuttling back and forth from Washington to furnish information for the messages and to keep the President abreast of important developments.

Present indications are that the President will call upon Congress to approve many of the proposals he submitted last year but on which no action was taken. He is expected to ask for a vast highway construction program with taxes furnishing the finances, broader coverage under social security laws, increased aid to farmers, health reinsurance, and some tax revisions.

While Budget Director Hughes has indicated that the budget will be balanced for the current year, and that this is also likely to be the case in the coming year, he would not commit himself to any tax reduction. Treasury Secretary Humphrey has not closed the door to tax reductions but still reaffirms his position that a balanced budget is of paramount importance. Politically minded members of Congress, however, have made it plain that personal income tax cuts are to be pushed at the coming session.

Since the next session will precede the national political conventions, it can be expected that political overtones will hang heavy over the consideration of major legislation. The political pot will also be kept boiling with a number of investigations into the Administration's conduct of various phases of Government.

Standby Controls

Some Administration officials, uneasy over the clouded international outlook, are suggesting that the President ask Congress, in renewing the Defense Production Act, to include authority for the imposition of a freeze on wages, prices and rents in the event of a national emergency.

It is understood that a request will be made for further extension of the present law early in the session. The Act carries provisions making it possible for the Government to lend financial assistance to mineral exploration programs, and authority for Government mineral purchase programs. Prior to the latest developments at Geneva, the Administration planned to ask for a two-year extension of the present law, but deterioration of foreign relations since that time have brought about a shift in thinking. Defense officials are said to feel that standby controls should be available in the event the United States should be forced to mobilize its industrial and military strength.

Whether Congress would go along with such a request remains problematical. Early this year the Administration was considering asking for such control authority but sentiment on Capitol Hill was so strongly opposed that no request was made.

Residual Oil Imports

ODM Director Arthur Flemming has written oil importers requesting them to sharply curtail imports of crude oil in the months ahead, but has stated that imports of residual fuel oils are in accord with the recommendations of the President's Advisory Committee on Energy Supplies and Resources. The Advisory Committee had declared that importation of crude and residual oils should not exceed significantly the respective proportions that these imports bore to the domestic production of crude oil in 1954.

Flemming's letter was the result of study by ODM of information submitted to it by oil importers as to oil imports during the first seven months and planned imports for the remainder of the year, as compared with corresponding months of 1954. The letter excepted oil of Canadian and Venezuelan origin from the crude import cut.

On the heels of this letter, ODM issued instructions to oil importers to submit monthly reports showing actual residual and crude oil imports for the preceding month and planned imports for the succeeding five months. These reports were required to begin with the month of October. Through these reports ODM expects to keep a close check on all oil imports and to see if further action is needed should imports exceed the Advisory Committee's recommendation.

Mineral Policy Committees

Late in November the Office of Minerals Mobilization announced the membership of 14 Industry Advisory Committees, to assist that agency in putting into effect the recommendations of the President's Cabinet Minerals Policy Committee to assure an adequate mobilization base and to "preserve a sound minerals economy." Meetings of the advisory groups are expected to be held before the end of the year.

The Committees and their membership are as follows:

Aluminum Industry Advisory Committee: Robert K. Beck, Apex Smelt-

Washington Highlights

STANDBY CONTROLS: Authority may be asked

OIL IMPORTS: Monthly reports required

OMM: Committees established

FREIGHT RATES: Increase made permanent

WALSH-HEALEY: Coal wage order enjoined

REDS IN UNIONS: Cases before Government

TARIFF HEARINGS: Prepare for Geneva

COAL MINE INSPECTION: New policy set

ing Co.; R. B. Caples, Anaconda Aluminum Co.; Richard L. Davies, Pennsalt International Corp.; Lawrence Litchfield, Jr., Aluminum Co. of America; D. A. Rhoades, Kaiser Aluminum & Chemical Corp.; Walter L. Rice, Reynolds Metals Co.

Antimony Industry Advisory Committee: James P. Bradley, Bradley Mining Co.; William B. Clancy, American Smelting & Refining Co.; Marc S. Goldsmith, Goldsmith Bros. Smelting & Refining Co.; Robert M. Hardy, Jr., Sunshine Mining Co.; J. W. Iliff, Harshaw Chemical Co.; F. S. Mulock, U. S. Smelting Refining & Mining Co.; Robert L. McGean, The McGean Chemical Co.; Frederick R. McIntosh, C. Tennant Sons & Co. of New York; Walton S. Smith, Metal & Thermit Corp.; W. J. Welch, National Lead Co.

Asbestos Industry Advisory Committee: Miles V. Engelbach, The Ruberoid Co.; D. W. Jaquays, Jaquays Mining Corp.; J. C. Kelleher, Johns-Manville Corp.; Charles R. Neal, Metate Asbestos Mines Corp.; S. R. Zimmerman, Jr., Raybestos - Manhattan, Inc.

Beryl Industry Advisory Committee: George V. Bland, Bland Mining & Milling Co.; L. G. Bliss, Foote Mineral Co.; M. J. Donachie, Beryllium Corp.; Arthur Montgomery, Harding Mine; Jay E. Rand, Whitehall Co., Inc.; J. R. Wemlinger, Beryllium Mining Co., Inc.

Chromite Industry Advisory Committee: John Bley, American Chrome Co.; Fay I. Bristol, Bristol Silica Co.; Charles F. Colbert, Jr., Pittsburgh Metallurgical Co., Inc.; W. Philip Cox, Chromium Mining & Smelting Corp., Ltd.; R. L. Cunningham, Ohio Ferro-Alloys Corp.; Dr. Alex L. Feild, Armco Steel Corp.; George C. Floyd, Vanadium Corp. of America; Fred S. Haggerson, Union Carbide and Carbon Corp.; Durand Hall, Castro Mining Co.; Joseph R. Holman, Joseph R. Holman; Dr. Andrew Leith, E. J. Lavino & Co.; Robert E. Leoni, Wm. H. Muller & Co., Inc.; W. B. Pierce, Allegheny Ludlum Steel Corp.; William S. Robertson, Oregon Chrome Mines, Inc.; Simon Seidenbond, Leonard J. Buck, Inc.

Columbium-Tantalum Industry Advisory Committee: F. H. Driggs, Fansteel Metallurgical Corp.; Fred S. Haggerson, Union Carbide & Carbon Corp.; K. C. Li, Wah Chang Corp.; Philip M. McKenna, Kennametal, Inc.; Robert P. Porter, Porter Bros. Corp.

Copper Industry Advisory Committee: Walter C. Bennett, Phelps Dodge Refining Corp.; A. B. Bowman, Banner Mining Co.; Kenneth C. Brownell, American Smelting & Refining Co.; John F. Cowley, Appalachian Sulphides, Inc.; Harold B. Ewoldt, Copper Range Co.; John H. Ffolliott, Miami Copper Co.; W. P. Goss, Magma Copper Co.; William W. Lynch, Calumet & Hecla, Inc.; E. S. McGlone, The Anaconda Co.; Frank R. Milliken, Kennecott Copper Corp.; Harold H. Sharp, Howe Sound Co.; Chester D. Tripp, Consolidated Coppermines Corp.; Jean Vuillequez, The American Metal Co., Ltd.; E. H. Westlake, Tennessee Corp.

Fluorspar Industry Advisory Committee: N. F. Adick, Miller-Adick Co.; C. O. Anderson, Ozark-Mahoning Co.; Jacob Blecheisen, Rosiclare Lead & Fluorspar Mining Co.; Peter D. Caron, American Smelting & Refining Co.; Robert H. Dickson, Allied Chemical & Dye Corp.; Robert N. Frazer, Kentucky Fluorspar Co., Inc.; Lawrence Litchfield, Jr., Aluminum Co. of America; Louis J. Lipton, Continental Ore Corp.; Gill Montgomery, Minerva Oil Co.

Lead Industry Advisory Committee: Thomas Bardon, Shattuck Denn Mining Corp.; John D. Bradley, Bunker Hill & Sullivan Mining & Concentrating Co.; W. H. H. Cranmer, New Park Mining Co.; William R. Dice, The Eagle-Picher Co.; Andrew Fletcher, St. Joseph Lead Co.; Robert M. Hardy, Jr., Sunshine Mining Co.; Sherman B. Hinckley, Rico Argentine Mining Co.; Jens Jensen, Pend Oreille Mines & Metal Co.; J. A. Martino, National Lead Co.; F. S. Mulock, U. S. Smelting Refining & Mining Co.; E. O. Sowerwine, International Smelting & Refining Co.; Simon D. Strauss, American Smelting & Refining Co.

Manganese Industry Advisory Committee: Paul J. Bertelsen, Paul J. Bertelsen; M. M. Bowman, African Metals Corp.; Leonard J. Buck, Leonard J. Buck, Inc.; John H. Cole, Domestic Manganese & Development Co.; R. H. Cromwell, Electro Manganese Corp.; S. S. Groggins, M. Golodetz & Co.; Fred S. Haggerson, Union Carbide & Carbon Corp.; Sanford R. Knapp, Taylor-Knapp Co.; Dr. Andrew Leith, E. J. Lavino & Co.; W. Lunsford Long, Manganese, Inc.; Robert M. Lloyd, U. S. Steel Corp.; Leslie B. Manning, American Machine & Metals, Inc.; E. S. McGlone, The Anaconda Co.; Floyd M. Simmons, Southeastern Manganese Corp.; Ivor D. Sims, Bethlehem Steel Co.; Edward H. Snyder, Combined Metals Reduction Co.; Al Stovall, Stovall Manganese.

Mercury Industry Advisory Committee: A. L. Albee, Bonanza Oil & Mine Corp.; Worthen Bradley, Bradley Mining Co.; S. J. Buckman, Buckman Laboratories, Inc.; Gordon I. Gould, Gordon I. Gould & Co.; Herbert R. Meyer, Ayrton Metal & Ore Corp.; Leo G. Nunes, Leghorn Trading Co., Inc.; J. J. Oberbillig, United Mercury Mines Co.; R. F. O'Bryan, California Quicksilver Mines, Inc.; J. M. Powelson, Sonoma Quicksilver Mines, Inc.; S. Ullmann, Philipp Brothers, Inc.; S. H. Williston, Cordero Mining Co.

Mica Industry Advisory Committee: W. E. Blood, Asheville-Schoonmaker Mica Co., Inc.; Gilmer A. Jones, Pollymiller Mining Co.; Sam L. Phillips, Sam L. Phillips; James B. Preston, Jr., The English Mica Co., Inc.; Jay E. Rand, Whitehall Co., Inc.; Andrew W. Reid, Andrew W. Reid; Solomon Rodvien, The Otto Gerdau Co.; Robert J. St. Peter, Leonard J. Buck, Inc.; Edward P. Sykes, Eugene Munsell & Co.; Frank W. Watts, Manager, Gillespie-Rogers-Pyatt Co., Inc.

Tungsten Industry Advisory Committee: Lyman A. Bliss, Union Carbide Nuclear Co.; M. M. Bowman, African Metals Corp.; James P. Bradley, Bradley Mining Co.; Arthur H. Bunker, Climax Molybdenum Co.; Lee D. Dougan, Gabbs Exploration Co.; William Flatow, W. R. Grace & Co.; Roy A. Hardy, Getchell Mine, Inc.; J. W. Hoefling, Surcease Mining Co.; Jacques E. Lennon, Continental Ore Corp.; K. C. Li, Wah Chang Corp.; W. Lunsford Long, Tungsten Mining Corp.; Philip M. McKenna, Kennametal, Inc.; Boris Pregel, Cold Spring Tungsten, Inc.; Charles H. Segerstrom, Jr., Nevada-Masschusetts Co.

Zinc Industry Advisory Committee: Thomas Bardon, Shattuck Denn Mining Corp.; John D. Bradley, Bunker Hill & Sullivan Mining & Concentrating Co.; R. B. Caples, The Anaconda Co.; Herman D. Carus, Matthiessen & Hegeler Zinc Co.; W. H. H. Cranmer, New Park Mining Co.; William R. Dice, The Eagle-Picher Co.; Andrew Fletcher, St. Joseph Lead Co.; Sherman B. Hinckley, Rico Argentine Mining Co.; Jens Jensen, Pend Oreille Mines & Metals Co.; S. T. Johnson, U. S. Steel Corp.; Robert G. Kenly, The New Jersey Zinc Co.; Warren H. Leverett, National Zinc Co., Inc.; J. A. Martino, National Lead Co.; F. S. Mulock, U. S. Smelting Refining & Mining Co.; Edward H. Snyder, Combined Metals Reduction Co.; Simon D. Strauss, American Smelting & Refining Co.; Jean Vuillequez, The American Metal Co., Ltd.; Howard I. Young, American Zinc, Lead & Smelting Co.

Announcement of the committee appointments came just before officials of OMM, the Interior Department and the Office of Defense Mobilization went before closed sessions of the House Interior Mines and Mining Subcommittee, to explain what progress had been made towards implementing the Cabinet Committee's report, and as to when some definite programs would be put into effect for specific minerals and metals. The Committee is displeased with the lack of any announcement as to concrete action by OMM and ODM, despite the fact that they have had since July 1 to come up with some firm programs for various branches of the mining industry.

Freight Rate Hike Approved

The Interstate Commerce Commission has stamped its approval on the railroad's request that the "interim" fifteen per cent freight rate increases granted in 1951 and 1952 be made per-

manent. These were scheduled to expire at the end of this year but the ICC ordered cancellation of the expiration date.

In granting the rate increases on a permanent basis, the ICC denied petitions of coal industry organizations which sought modification or elimination of the temporary boosts in coal freight rates. It is likely that legislation will be introduced at the next session of Congress to reduce these rates. West Virginia members of Congress have indicated that they will sponsor such a proposal.

In a lengthy decision, the ICC said that "products of mines generally consist of commodities of the lowest value, with the shortest average haul, the heaviest loading, and the greatest volume, with negligible claims for loss and damage, and with rates generally made on a group or differential basis; and constituting the greatest proportion of the destination value, yielding the lowest amounts per ton mile and the highest amounts per car-mile with the greatest susceptibility to truck and water competition." It also stated that these commodities have been accorded lower increases than commodities generally since World War II. The ICC concluded that increases in rates on mineral commodities, granted in 1951 and 1952, are fully justified by the cost and value of the service rendered by the railroads.

Coal Wage Order

The Central Pennsylvania Open Pit Mining Association, composed of 67 coal producers, together with a group of 487 small southwest Virginia coal mine operators have obtained a Federal court injunction temporarily blocking the coal minimum wage order, issued under the Walsh-Healey Act in mid-October, from going into effect on November 25. That order applies to Government contracts in excess of $10,000. The minimum wage determinations, announced by Labor Secretary Mitchell, range from $1.40 an hour for Iowa to $2.346 an hour for Montana, and had been sought by a large number of coal producers and the United Mine Workers of America.

Federal Judge Edward A. Tamm granted the injunction on a preliminary basis, and promised a speedy determination on the merits of the order's legality at a future hearing for a permanent injunction.

The temporary injunction applies only to the producers who sought it. The remainder of the bituminous coal industry became subject to the conditions of the wage order on November 25.

Communism in Unions

The Subversive Activities Control Board is considering a number of motions by attorneys for the International Union of Mine, Mill and Smelter Workers which would postpone or bring to a halt efforts of the Department of Justice to have the union designated as Communist-infiltrated. The Justice Department's petition charged that the union is Communist-infiltrated but said that the infiltration came about without knowledge of the large majority of the union members. During the hearing the union sought to have SACB members Thomas J. Herbert and Harry P. Cain disqualified from sitting on the case, contending that they had attended a closed session of the Senate Internal Security Subcommittee together with Justice Department officials, at which the Committee urged the Government to proceed with the Communist-infiltration action.

Meanwhile, a U. S. Court of Appeals has blocked an effort by the National Labor Relations Board to deny the IUMMSW collective bargaining rights under the Taft-Hartley Act. The NLRB had sought to revoke the union's compliance status under the law on the grounds that union members knew that Maurice Travis, union secretary, falsely swore in affidavits that he was not a Communist. The court held that Congress had provided criminal penalties for false non-Communist affidavits and that if this was insufficient "it is for Congress, not the courts, to provide new ones."

Out in Chicago, meantime, another union—the United Electrical, Radio and Machine Workers—was denied use of NLRB services by another Federal Court of Appeals. The case involved the union, the NLRB and the Goodman Manufacturing Co. The Federal judges held that not all officials of the union had filed non-Communist affidavits as required by the Taft-Hartley Act. The union had contended that secretaries of 12 district councils of the union and three trustees of the international organization were not officials and thus not required to file the affidavits. The court held them to be officials.

Tariff Hearings

The U. S. Tariff Commission and the Committee for Reciprocity Information concluded hearings in mid-November in preparation for United States participation in multilateral and reciprocal trade negotiations with 25 foreign nations, which begin next month in Geneva. During the hearings almost 150 witnesses appeared and either registered objections to any further tariff cuts on U. S. commodities or urged the further lowering of present import duties.

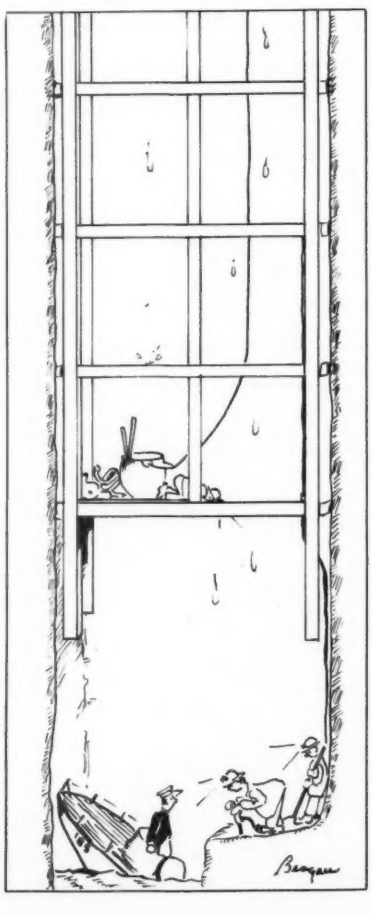
Representatives of many branches of the mineral industry testified in opposition to any further reductions in present tariff rates.

There are more than one thousand items on the list under consideration by the Tariff Commission and the Reciprocity Committee, and before negotiations get under way at Geneva the Tariff Commission must set a "peril point" for each commodity—the point below which any reduction in duty would seriously harm a domestic industry or threaten national security. While the negotiators are not required to follow the Tariff Commission's findings, should concessions be granted at rates below the "peril points" set by the Commission, the President is required to explain to Congress the reasons for such action.

Coal Mine Inspection

Beginning the first of the year the U. S. Bureau of Mines will adopt a new policy in recording violations of the Federal Coal Mine Safety Act and Federal mine safety regulations.

Under the new policy, which will be on a trial basis for one year, coal mine inspection personnel of the Bureau will not report violations which are corrected promptly after detection, as verified by the inspector. Under existing policy, such violations are reported despite the fact that they are corrected at once. If the new policy proves a success it will be continued, according to Bureau spokesmen.



AMC Personals

Wallace G. Woolf has been named general manager of Bunker Hill & Sullivan Mining & Concentrating Co. of Kellogg, Idaho. He succeeds **P. C. Fedderson**, who retired on October 1.

Woolf will continue in his capacity as manager of metallurgy, manager of both the lead smelter and the zinc plant, and head of all sales and ore procurement. Woolf came to Kellogg in 1918 as a research metallurgist and was named general superintendent of the Sullivan Electrolytic Zinc plant in 1928. He continued in this capacity until he was appointed manager of metallurgy for Bunker Hill several months ago.

The Board of Directors of the United Electric Coal Cos. has elected **R. J. Hepburn** vice-president in charge of operations. Hepburn was formerly purchasing agent and in charge of labor relations. **D. A. Ford** was elected assistant treasurer, **John J. Huey** will be in charge of all machinery design and maintenance. **William A. Patty** will be purchasing agent.

Earl C. Herkenhoff resigned his position as assistant chief metallurgist for Pickands Mather & Co., Hibbing, Minn., to accept a position as chief metallurgist with the Utah Construction Co. of San Francisco, Calif., where he will be in charge of a new metallurgical laboratory at Palo Alto. Herkenhoff's experience includes positions in the southwest with the New Jersey Zinc Co. and the Phelps Dodge Corp. and with The Anaconda Co. in Montana. From 1941 to 1951, he worked on various assignments for the American Cyanamid Co. in the east before going to the Lake Superior region.

At a recent meeting of the Board of Directors of Copper Range, **John P. Lally** of Pittsburgh, vice-president and director of the company, was elected president of the company to fill the vacancy caused by the death of Morris F. LaCroix.

To fill the vacancy on the Copper Range Co. Board, the directors elected **George Olmstead, Jr.**, president of S. D. Warren Co. An Executive Committee was appointed consisting of **Nelson J. Darling, Jr., Walter Hochschild, John M. Foster and John P. Lally.**

The directors of the White Pine Copper Co., a wholly-owned subsidiary of Copper Range Co. also elected Lally president of that company.

A. W. Beck, general superintendent, Ore Mines & Quarries Works, Tennessee Coal & Iron Division, United States Steel Corp. has announced the appointments of **Leland H. Johnson** to assistant general superintendent, **L. S. Chabot, Jr.**, to chief engineer, **E. H. Stevens** to works industrial engineer and **Ralph Towers** to superintendent of industrial relations.

L. H. Johnson

L. S. Chabot, Jr.

Joseph B. Perry has retired as chief mining engineer for the Chemical Division of Food Machinery & Chemical Corp. after 35 years' service with FMC and predecessor companies. He was honored on October 21 with a testimonial dinner at which **M. Y. Seaton**, corporate vice-president and technical coordinator, was master of ceremonies.

J. W. Kinnear, Jr., has been appointed vice-president of operations for the Tennessee Coal & Iron division of United States Steel Corp. succeeding **J. M. Spearman**, who becomes assistant to the president.

Formerly chief construction engineer for his company, Kinnear has had broad experience in engineering and construction of refinery and chemical plants.

T. B. Counselman has been made a partner and elected secretary-treasurer of Behre Dolbear & Co. An authority in the ore dressing field, Counselman has had varied and broad experience with the concentration of iron ore in Minnesota, New York State and Alabama, and copper in the Southwest and Mexico. Other experiences range from mine operating to blast furnace engineering and heavy chemical processing. A graduate of Columbia University, he is now a director and vice-president of the American Institute of Mining and Metallurgical Engineers.

Dr. **Lauchlin M. Currie** has been appointed a vice-president of Union Carbide Nuclear Co. He was formerly vice-president of National Carbon Co., Associate Director of War Research for the Manhattan Project, and has held administrative positions in both research and production with National Carbon and the Bakelite Co.

Robert Miller, former mining geologist with Day Mines, Inc., Wallace, Idaho, has been named field representative of the Atomic Energy Commission in Tucson, Ariz. In his new position, Miller will examine properties in southeastern Arizona.

Howard B. Thorpe, formerly vice-president of North American Coal & Dock Co., a subsidiary of the North American Coal Co., has been promoted to vice-president of the parent firm.

Alexander C. Brown has relinquished his duties as chief executive officer of the Cleveland-Cliffs Iron Co. He continues as chairman of the board. **Walter A. Sterling**, president, has been assigned the duties of chief executive officer.

A. C. Brown

W. A. Sterling

Brown, who joined Cleveland-Cliffs in 1934 as first vice-president, became president of the company in 1947 and chairman of the board in 1953. In June 1952, the board made him chief executive officer as well as president.

Sterling has been with the company since 1929. He became manager of Minnesota Mines in 1949, vice-president in charge of mining operations in 1950 and president in 1953.

Francis R. Boyle has been appointed superintendent, No. 14 Mine of the Gary District of United States Steel Corp. His experience includes mine labor, industrial engineering, and assistant superintendent assignments within the Gary division.

James F. King has been appointed assistant to the president of Freeport Sulphur Co., Langbourne M. Williams, president, announced.

A graduate of Harvard in 1929, King has held posts in the government including the Central Intelligence Agency, the Defense Production Administration and the Department of Defense where he was assistant secretary of the Army. King was previously a newspaperman.

B. M. DuBois, of Clearfield, Pa., has been elected president of the Central Pennsylvania Open Pit Mining Association.

John F. Dugan has been appointed personnel consultant for the Anaconda Co. Starting early in the spring of 1956, he will visit colleges to interview student engineers interested in employment with the Anaconda Co. Dugan, formerly general superintendent of mines for the International Smelting & Refining Co., can be contacted at 818 Kearns Bldg., Salt Lake City 1, Utah.

Robert F. Bruzewski has been appointed assistant professor to the School of Mines and Metallurgy, University of Minnesota. Bruzewski, a graduate of the Wisconsin Institute of Technology, holds an M.S. degree in mining from the University of Missouri School of Mines and Metallurgy where he has been teaching and doing mining research since 1947.

George E. Alter, Jr., has been appointed manager of Jones & Laughlin Steel Corporation's Blair Limestone Division, Martinsburg, W. Va. He succeeds **T. J. McCarthy**, who retired after 30 years of service with J & L.

Alter has been assistant manager since October 1951. He joined J & L in 1948 and served as mine industrial engineer at J & L's New York Ore Division, Star Lake, N. Y., until his assignment as McCarthy's assistant.

Walfrid Been, mine superintendent in the Oliver Iron Mining Division of the U. S. Steel Corp. has been appointed head of the Mining Engineering Dept. of the Michigan College of Mining & Technology, Houghton, Mich. He will take over the department head duties from **Prof. J. Murray Riddell**, who plans to remain in Houghton for part-time teaching service and professional activities. Been has had broad engineering and operating experience with several companies of the Lake Superior District, including foreign assignments.

F. J. Hoyne, R. F. Barrow and **L. B. Girard**, all sales executives, were appointed vice-presidents of the Southern Coal Co., Inc.

Harold Howe has been elected secretary of the American Smelting & Refining Co. Howe started with the company as an office boy and has been assistant secretary since 1941.

H. B. Lammers has joined the staff of Appalachian Coals, Inc., Cincinnati, as chief engineer.

William Gibson was recently appointed division industrial engineer for the Nevada Mines Division of Kennecott Copper Corp., according to a recent announcement made by J. C. Kinnear, Jr., general manager. Gibson replaced **M. J. O'Shaughnessy** who has been named assistant general manager of the Nevada Mines Division.

Roy T. Sessums, former dean of engineering at Louisiana Polytechnical Institute, has joined the Freeport Sulphur Co. in an executive capacity.

— *Obituaries* —

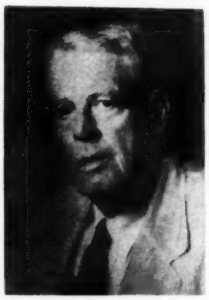
Blaine S. Smith, retired president of Universal Atlas Cement Co. and prominent figure in the cement and allied industries, died suddenly October 27 at New Rochelle, N. Y.

Mr. Smith, who had been associated for more than 37 years with the cement company, a U. S. Steel Corp. subsidiary, retired on December 31, 1953, continuing for a time with the company in a consulting capacity. He began his career in the cement industry in 1908 as salesman for the Universal Portland Cement Co. in Chicago. From 1915 to 1928 he served the company as general sales manager, director and vice-president. From 1928 to 1936, he was president and director of the Penn-Dixie Cement Corp. in New York, returning to Universal Atlas as president and director in 1936, in which capacities he served until his retirement.

Robert E. Lawson, 78, Harlan County, Ky., coal operator, died at his home in Harlan following a long illness. He went to Harlan County in 1913 and took an active part in the religious, civic, and business growth of the community. He had broad coal mining experience and retired in 1945 as general manager of the Cornell-Lewis Coal Co.

Peter P. Kerr, 69, former general manager of the New River and Pocahontas Coal Co., Bluefield, W. Va., died in Gainesville, Fla. from head injuries received in a two-car collision. Retired in 1951, Mr. Kerr had been living in St. Petersburg, Fla. He was enroute to Bluefield to visit when the fatal accident occurred. Born in Scotland, he started his mining career at the age of nine and climbed the ladder of success with the encouragement and admiration of those who worked with him. Mr. Kerr became associated with the Peter White Coal Co. 35 years ago and advanced to the general managership of the New River and Pocahontas Coal Co., a subsidiary.

Burt B. Brewster, 65, editor and publisher of *The Mining and Contracting Review*, of Salt Lake City, died on October 29 of a cerebral hemorrhage. Well known in mining circles throughout the nation, Mr. Brewster had owned and published the *Review* since 1934. For more than 15 years he had written newspaper columns under the bylines of "The Shift Boss," "The Observer," and "The Oldtimer." Having received his mining engineering degree from the Michigan College of Mines in 1911, he served as chief engineer of Willis Coal & Mining Co., and of Columbia Quarries Corp. in St. Louis for a year. He became sales engineer for Sullivan Machine Co. in 1912 and served as manager in Juneau, Alaska, as Inter-Mountain manager in Salt Lake City and as manager of the Illinois, Indiana, Kentucky offices for that company until 1932. He entered private consulting engineering practice in 1932, and bought *The Mining and Contracting Review* in 1934.



An ardent Republican throughout his life, Mr. Brewster had extreme courage in his convictions. He invariably printed the news without "pulling punches," and never hesitated to register his views and those of his industry—no matter how controversial the subject.

NEWS and VIEWS

Eastern and Central states

To Produce Taconite

Cleveland-Cliffs Iron Company's Republic taconite mine, in the Lake Superior region, is being developed rapidly and should be in production in the Spring of 1956. The concentrates produced by the mine will be pelletized in a new agglomerating plant at Eagle Mills, Mich.

Reactor Work Started

Alco Products, Inc., Schenectady, N. Y., has begun construction work on the Army Package Power Reactor project at the Engineer Research and Development Laboratories, Fort Belvoir, Va. The contract for the project was awarded by the Atomic Energy Commission to Alco Products, Inc., in December 1954. Since then Alco has been engaged in the detailed design of the plant, which will generate about 2000 kw of electricity for use in normal post operations at Fort Belvoir.

The plant has been designed so that components of future units can be airlifted to remote sites. After assembly, this type of plant is expected to operate reliably for extended periods without refueling.

Coal Properties Sold

C. H. Sprague & Son Co., Boston, Mass., a coal sales company, has purchased the capital stock of Gulf Smokeless Coal Co. of Beckley, W. Va., and has taken over operation of all Gulf Smokeless mines, W. P. Tams, Jr., Gulf Smokeless president, announced. Tams said about 50,000,000 tons of coal and 1500 acres of property were involved in the sale.

Included are the Tams No. 2 mine at Tams, MacAlpine Mine at MacAlpine, and Winding Gulf No. 4 mine at East Gulf, all in Raleigh County; the Lamar Mine at Herndon in Wyoming County and the Louisville Mine at Goodwill in Mercer County, W. Va. Mining communities of MacAlpine, Tams and Epperly, all in Raleigh County, are also involved.

Tams said the mines produce approximately 125,000 tons of metallurgical-quality coal per month and handle an additional 30,000 tons monthly from stripping operations.

The purchase followed by about a month the acquisition of the MacAlpine and Winding Gulf properties by Gulf Smokeless.

To Work Sulphur Deposit

Development of sulphur deposits at High Island on the Gulf of Mexico, about 45 miles southwest of Beaumont, Texas, is planned by Sulphur Exploration Co. of Houston. The company has entered into an agreement with Stanolind Oil & Gas Co. for sulphur rights to the oil dome, and the original plant, which will cost about $1,000,000, should be under construction before the end of the year. The Frasch extraction process is expected to be used in the recovery of between 700,000 and 1,000,000 tons of sulphur in the dome.

Cement Expansion Speeded

Lehigh Portland Cement Co., Philadelphia, Pa., has stepped up its expansion program, Joseph S. Young, president, has announced. By the end of 1956, the company will have 27,200,000 bbl of annual capacity, a gain of 41 percent over 1945. The previous goal had been 26,500,000 bbl by December 1956.

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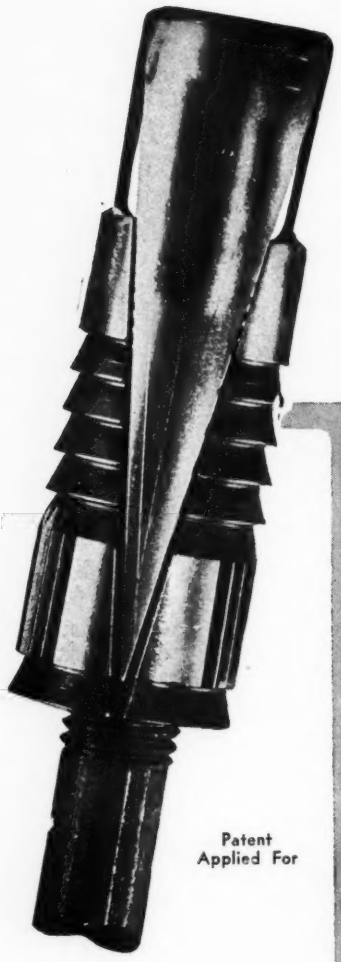

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Inco Drives Two Tunnels to Release Nickel Ores for Surface Mining

View of International Nickel's Frood-Stobie Open Pit in the Sudbury District of Ontario showing location of two tunnels which will permit rerouting of traffic and make it possible to mine blocks of ore beneath the main ramp road by surface methods. The tunnel on the left will be 1800 ft in length and the other 400 ft

The International Nickel Co. of Canada, Ltd., is driving two vehicular tunnels with a total length of 2200 ft in the walls of its Frood-Stobie Open Pit in the Sudbury District of Ontario to permit greater recovery of ore by surface mining methods.

The tunnels will take the place of sections of the main ramp road which winds for almost two miles around the sides of the Open Pit, now nearly 600 ft deep. When the tunnels are completed, pit traffic will be routed through them, and the affected portions of the ramp road will disappear as the ore over which they lie is mined.

The ore is comprised of a large block in the footwall, as the wall on the underside of a vein or ore structure is known, and a smaller block on the hangingwall, or upper side. A total of 5,000,000 tons of ore is involved.

Originally it was planned to recover the ore by underground methods after all surface mining had been completed and the road was no longer required. The ore would then have been mined by the same methods as are being used in the south end of the Frood section of the pit, and also in the Stobie section, where surface operations have been replaced by deep mining carried on from the 600 ft level underground.

The tunnels will be 14 ft wide and 15½ ft high. They will be driven some distance inside the footwall and hangingwall but parallel to the ramp. The longer tunnel, in the footwall rock, will be 1800 ft long. The other tunnel, 400 ft in length, will be driven in the hangingwall rock. Construction of the longer tunnel has begun and is proceeding at the rate of 100 ft per week. When both are opened to traffic, trucks will move up through the 1800-ft leg, then come out at the south end of the Open Pit before entering the hangingwall tunnel. A smooth, safe flow of trucks hauling ore from the pit will be controlled by stop-and-go lights at the tunnel portals.

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Address inquiries to the Editor. Include information on age, education, experience, marital status and a recent photograph.

Bureau Adopts New Policy

Effective January 1, 1956, The U. S. Bureau of Mines will adopt for a trial period of one year, a new reporting policy with respect to violations of Federal mine safety laws which are corrected immediately or during the course of an inspection. The Bureau has instructed all coal mine inspection personnel that, during the trial period, such violations "shall not be reported in the final report as a violation or as a danger eliminated." The Bureau hopes that this relaxation in its reporting policy will provide the coal mining industry with sufficient incentive to make a more determined effort to comply with safety laws between regular Federal inspections.

The Bureau's new policy was announced following a conference of Bureau officials, the safety director of the United Mine Workers of America, and safety directors of various coal associations.

Court Upholds Safety Board

The U. S. Court of Appeals for the Sixth Circuit has affirmed the decision of the Federal Coal Mine Safety Board of Review in the Princess Elkhorn Coal Co. case. The board had ruled that a mine cannot be classified as gassy on the basis of an air sample taken less than 12 in. from loose coal cuttings.

The Court upheld the Board's interpretation that the term "face" as used in the Federal Coal Mine Safety Act includes loose or broken coal. Conceding that "all three members of the Board are thoroughly expert in the field of coal mining," the Court said that they "are much better qualified than are the members of this court to interpret the meaning of the word 'face' as used in the Act."

New Kiln in Operation

The first new kiln of the Medusa Portland Cement Company's York, Pa., plant, now is in operation and should reach the designed rate of production shortly, Ellery Sedgwick, Jr., company president, reported to stockholders. Satisfactory progress is being made on the installation of a second new kiln at York and it is expected to be in operation within a year. Sedgwick also said that most of the major equipment for expansion of his company's Dixon plant is now under contract, and construction work is under way.

Nicaro Production Rises

The U. S.-owned Nicaro nickel plant in Cuba, which has just begun its fourth year of full operation, produced at the annual rate of 31,215,000 lb of nickel in the third quarter of 1955, the General Services Administration has announced.

This record rate tops the target of 31,000,000 lb set when the plant built in World War II, was returned to operation after a post-war shutdown. Nicaro has produced nearly 100,000,000 lb of nickel since it was started up in January 1952.

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Vanadium Plant Planned

The Vanadium Corp. of America will build a new plant in Jefferson County, Ohio, for production of ferro-alloys. The company has taken options on sites comprising about 350 acres between Wheeling, W. Va. and Steubenville, Ohio, near the Ohio River.

"The contemplated new plant is necessitated by substantially increased demands for ferro-alloys by the steel and aluminum industries," said W. C. Keeley, president.

Joint Aluminum Venture Studied

The Federal Government's decision to deny further accelerated amortization on aluminum projects may hamper joint diversification plans of the St. Joseph Lead Co. and Pittsburgh Consolidation Coal Co., Andrew Fletcher, St. Joseph president, has reported to his company's stockholders. That decision will necessitate "giving further consideration to the advisability of building on a joint ownership basis a 66,000-ton aluminum reduction plant and a 25,000-kw power station at Josephtown, Pa., adjoining our electrothermic zinc smelter," Fletcher said.

He also told St. Joseph stockholders that a detailed engineering study of the joint venture has been completed which in general substantiates the preliminary estimated operating cost and the $80,000,000 capital expenditure announced earlier this year.

Chile to Buy Machinery

The Mining Credit Bank of Santiago, a Chile government agency entrusted with promoting the development of medium and small mines in Chile, has been authorized to borrow $3,000,000 for the purchase of mechanization equipment. The Mines Ministry says these purchases—to be made on the basis of competitive bids—will be mainly compressors, drills, diesel motors, steel cable, electric motors and generators, spare parts, equipment for pumping sand and water, mills, and others.

Cerro De Pasco Expands

Cerro de Pasco Corp., a 53-year-old mining company with principal operations in Peru, announced October 27 that an agreement had been reached for the purchase of the assets of the Circle Wire and Cable Corp. of Maspeth, L. I., for $20,250,000, and the assumption of certain liabilities of Circle, subject to approval of the latter's stockholders.

Officials of the mining firm saw the move as a major step in the company's broad diversification program launched several years ago.

The agreement, jointly announced by Frank F. Russell, board chairman of Cerro de Pasco, and Sol Furst, president of Circle Wire & Cable, has been adopted by directors of the two corporations.

Approval of the purchase will add to the Cerro de Pasco enterprise a company that manufactures over 100 separate wire and cable products used for lighting, heating and power, in industrial, institutional and residential construction and development, both in the United States and abroad.

The prospective purchase of Circle Wire & Cable is an outgrowth of a policy of diversification announced by Cerro de Pasco several years ago.

Previous steps in furtherance of this policy, which in effect is coupling modernization and expansion of existing properties with broad geographic and product diversification, include:

(1) A $50,000,000 zinc development program initiated in Peru in 1951.

(2) A 16 percent participation in the Southern Peru Copper Corp. which has instituted a $200,000,000 program to exploit in Peru's Tacna Province ore reserves reputed to be among the largest in the world.

(3) Acquisition of a 45 percent ownership in a Peruvian company producing wire and cable for the local Peruvian market.

(4) Acquisition of a 40 percent interest in a Peruvian company which is to manufacture refractory brick.

(5) Participation in the organization of another Peruvian firm which will produce explosives.

(6) Preliminary prospecting for oil in the Eastern Peruvian jungle.

(7) Continued oil and gas exploration on a limited scale in the United States.

During the first six months of 1955, Cerro de Pasco's sales, totaling $33,506,257, were at the highest level for any similar six months in its history. They were less than one percent below the all-time peak recorded during the second half of 1951.

Net income for the period, before a depletion deduction permitted for income tax purposes, amounted to $5,833,792. This compared with $2,450,728 in the first six months of 1954.

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Towboat "Salvati" Ordered

A new twin-screw, 148-ft river towboat, the "Raymond E. Salvati," has been ordered by the Island Creek Fuel & Transportation Co., Huntington, W. Va., for the firm's expanding coal trade on the Ohio River. To be named in honor of the president of Island Creek Coal Co., the vessel will be powered by two diesel engines totaling 2560 shaft horsepower.

The hull of the vessel, to be built by Dravo Corp., Pittsburgh, will incorporate design features developed by Dravo during model-basin tests in the Netherlands. These design improvements will give the boat more barge-pushing ability per horsepower than towboats of similar class.

The "Salvati" will move 20 barge loads of coal—approximately 19,000 tons—in a single trip upstream against the Ohio River current. Some of the vessel's modern features include radar, ship-to-shore telephone and hydraulic steering system for the six rudders.

Atlas Opens Addition

Atlas Powder Co. has completed a $100,000 nitration process laboratory at its explosives experimental laboratory at Reynolds, near Tamaqua, Pa. The new laboratory is a pilot-plant installation which will allow studies of nitration reactions in plant-type equipment, but on a smaller scale than is practicable in an operating plant. Nitration is an important step in the manufacture of most industrial explosives.

W. J. Taylor, director of research for Atlas' explosives department, said the new laboratory will permit the handling of both solid and liquid compounds on a scale large enough to study the type of model that would arise in full-scale plant production.

Coals to Toledo

Steadily increasing rail freight rates between Southern Ohio mines and Toledo, Ohio, was the prime factor in a "coals to Newcastle" farce that was recently enacted in Toledo. On September 26 a 12,000-ton load of coal was brought in by boat for delivery only a quarter of a mile from one of the largest coal shipping docks in the world. Reported to be the first ever brought in by boat to Toledo for use by local utilities, the coal shipment was unloaded at the coal dock of Toledo Edison Company's new Bay Shore Station.

The delivery was the first on an order of 330,000 tons which will be carried by rail from western Pennsylvania to Conneaut, Ohio, and brought to Toledo by boat. Management of the utility company reports that the decision to bring coal in from Conneaut on Lake freighters will result in "substantial savings" to the utility.

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Large industrial company, NYC, is interested in man with technical education and 3 or more years coal-mining experience for position in central purchasing dept. buying coal for power and process use. Send resume of education and work experience to BOX NO. 213.

Leisenring No. 2 Shuts Down

United States Steel Corp. will close down one of its oldest coal mines on December 31 because the remaining small amount of bituminous coal will no longer permit safe operation. The mine, Leisenring No. 2, was opened in 1882 along with two other pits in the 8900-acre Leisenring coal field in southwestern Pennsylvania. About 230 men were employed in the pit, which recently was producing about 1500 tons of coal a day. The Leisenring No. 3 pit in the same field will remain in operation for about four more years.

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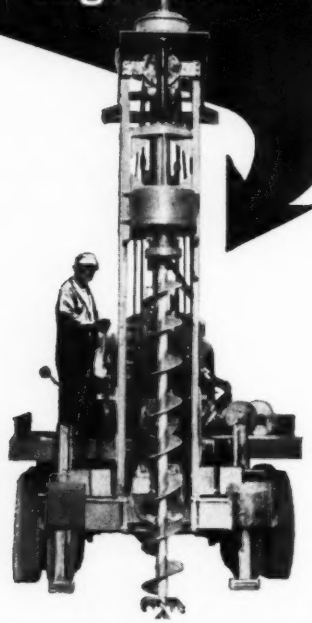

NEW HEAVY-DUTY McCARTHY drills 8-inch holes 100 feet deep in sandrock in 40 minutes *

* Ohio River Colliery Co., Cheshire, Ohio

This new heavy-duty drill, Model 106-24, is used for blast hole drilling, general exploration, foundation drilling, dewatering operations, deep post holes, etc. Has high-speed power take-off for small diameter augers, and low-speed power take-off (3 to 1 reduction) for large diameter augers. Hydraulically operated throttle valve.

AUGER DIAMETER			DEPTH OF BORE
20	INCHES		30 FEET
16	"		40-60 "
12	"		60-80 "
8	"	and under	100 "

8" and 9" diameter augers bore through shale and sandrock to produce larger diameter holes for new type explosives. Larger diameter augers bore through shale and hardpan formations. The choice of contractors where the going is tough.

For complete information contact The Salem Tool Co. Ask for Bulletin M-100

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Order 19-Oven Coke Plant

Pittsburgh Steel Co. has awarded a contract to Koppers Co., Inc., for the design and construction of a 19-oven coke battery with auxiliary equipment, to be erected at the company's plant at Monessen, Pa.

The new coke oven battery will increase the coal carbonizing capacity of the Monessen Plant 25 percent to 2500 net tons per day. The 19 ovens will be of the Koppers-Becker underjet type.

In addition to the ovens, the contract calls for the construction of a primary cooler, a final cooler, a coke pusher and other coke handling equipment, and an electrostatic precipitator. This auxiliary equipment has been designed in keeping with Pittsburgh Steel's overall program at Monessen.

It is expected that construction of the new battery will be completed by June 1956.

Settle Florida Phosphate Strike

Negotiations were completed September 30 for the settlement of a four-month-old Florida phosphate strike by the International Chemical Workers Union, Local 35 (A. F. of L.) against International Minerals & Chemical Corp.

The strike was climaxed September 28 when Louis Ware, president of the corporation, stated in a letter to the employes which also was published in full page newspaper advertisements that "immediately after October 1, if the regular workers do not return we must proceed with recruiting new employes."

During the full strike period portions of the company's operations were manned by supervisory staff members. Limited production, therefore, was maintained throughout the period of the strike, which was punctuated by the dynamiting of the company's phosphate chemical plant near Bartow and other acts of violence and intimidation that finally resulted in the issuance of a restraining order by the Circuit Court in Polk County limiting picketing to not more than two pickets at each of four locations in the area of the company's properties. During the closing days of the strike a panel composed of three commissioners of the Federal Mediation and Conciliation Service met with company and union representatives and assisted in the successful completion of negotiations.

On learning of the completion of negotiations and the settlement of the strike, Mr. Ware said:

"I am very happy to learn that after these four long months of strike and unfortunate incidents negotiators for the company and the union have reached a settlement.

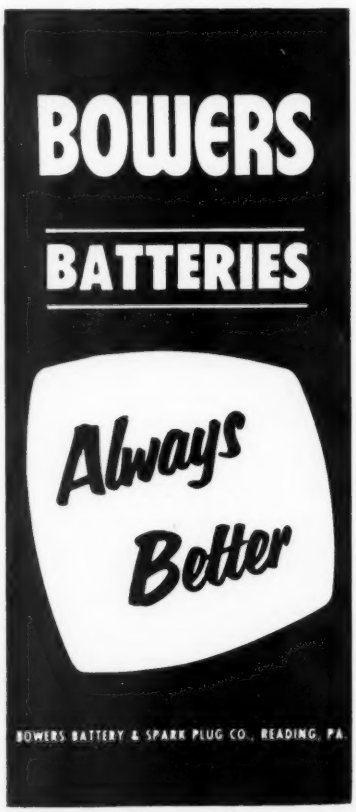
"Confidence of our management in the future of phosphate chemicals operation in Florida is indicated in the fact that International's board of directors recently has appropriated in excess of $500,000 for new expansion at the Bonnie phosphate chemicals plant.

"This first step of a long range program provides for substantial increases in the production of sulfuric acid, triple superphosphate and dicalcium phosphate, and in shipping facilities."

TVA Coal Supply

The Tennessee Valley Authority has reported that of approximately 12,000,000 tons of coal received at TVA steam generating plants during the fiscal year 1955, 5,400,000 were shipped by rail, 4,100,000 by a combination of rail and barge, 1,600,000 by barge, and 900,000 by truck. At the present time fuel is being received at the rate of 17,000,000 tons a year, TVA said. Coal is received from mines in Alabama, Illinois, Indiana, Kentucky, Tennessee and Virginia.

TVA buys coal on Btu basis rather than a tonnage basis. The average cost of all coal received during fiscal 1955 was 18.11 cents per million Btu. The average cost of coal received during the year on a tonnage basis, the Agency reported, was $4.33, including handling cost at the plant.



Preparation Plant Ordered

Carbon Fuel Co., Charleston, W. Va., has signed a contract with McNally-Pittsburg Mfg. Corp., Pittsburg, Kan., for construction of a modern coal preparation plant at Winifrede, Kanawha County, W. Va. The plant, an expansion of present coal preparation facilities, will serve Carbon No. 6 mine and any future development of company property on Field's Creek.

The plant is designed to process 300 tph, with 250 tons being mechanically cleaned. There will be five loading tracks at the plant.

Joint Coal Meeting Held

The Central Appalachian Section of AIME and the West Virginia Coal Mining Institute held their annual meeting in White Sulphur Springs, W. Va., on November 11 and 12. The program included technical, mining, and business sessions. Roland C. Luther, Bluefield, W. Va., is president of the West Virginia Coal Mining Institute; George O. Tarleton, Jenkins, Ky., is chairman of AIME's Central Appalachian Section. The program was arranged by R. Glenn Lazzell and J. Byron Herring of Huntington, W. Va., and Robert E. Edele of Morgantown, W. Va.

May Produce Aluminum

Olin Mathieson Corp. and St. Joseph Lead Co. are taking separate steps to enter the primary aluminum-producing business. Olin, planning an $85,000,000 project on the Ohio River in the Tri-State area around the West Virginia pan-handle, is negotiating with American Gas & Electric to get electricity for this operation from a proposed new generating plant. It would use low-cost fuel from Pittsburgh Consolidation Coal Company's nearby coal fields.

St. Joseph Lead and Pittsburgh Consolidation are asking Duquesne Light Co. to give them a similar contract to supply power for an $80,000,000 aluminum plant which St. Joe and the coal-producing company propose to build jointly in Pennsylvania.

More U. S. Coal for Germany

An additional 300,000 tons of U. S. coal will help keep West Germany's railroad trains running this winter. West German fuel experts believe that this additional tonnage will push the current year's total coal purchases in the United States to at least 6,500,000 tons and possibly to more than 7,000,000 tons. Officials said these figures reflect "a much larger demand" for coking coal for German industry, particularly iron and steel plants, combined with inability of Germany's own mines to step up production to meet that demand.

Coal-Chemical Plant Slated

Union Carbon & Carbide Corp. plans to start construction within a year or two on its long-planned plant for producing chemicals from coal. The cost of the plant, according to Joseph G. Davidson, vice-president, is estimated to run "anywhere from $50,000,000 to $100,000,000."

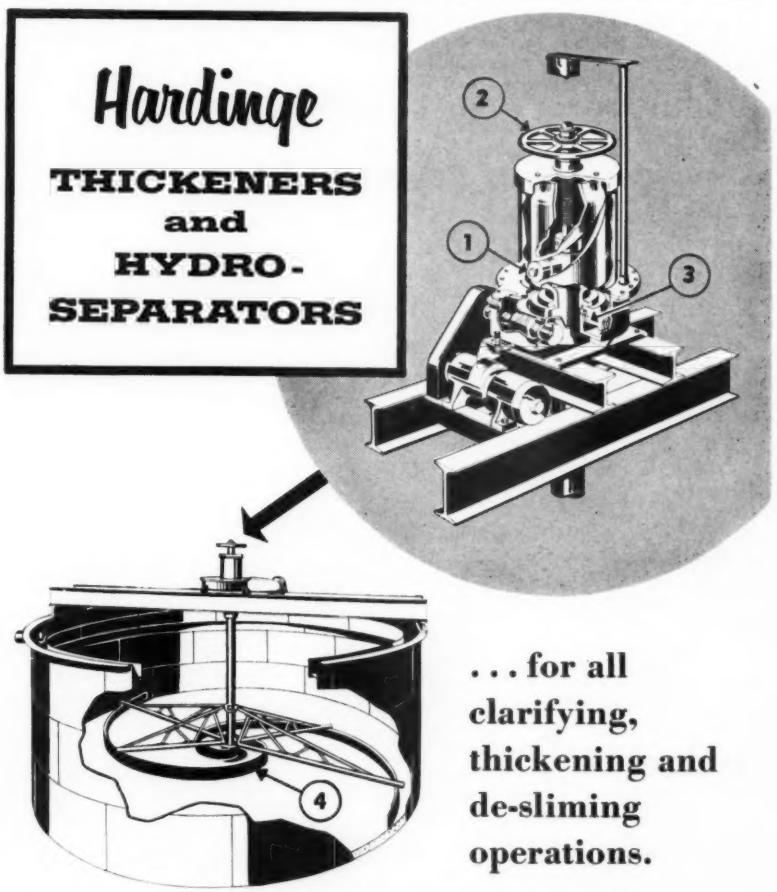
This expenditure would be in addition to the $32,000,000 which Union Carbide already has spent in research, development and pilot plant work on the project.

Dr. Davidson, who was awarded the Chemical Industry Medal for 1955 "for conspicuous services to applied chemistry," said his firm thinks a plant capable of handling 1000 tons of coal daily is a minimum size for economy, and a 3000 to 6000 tpd plant would be better.

Union Carbide's experimental hydrogenation process, now being revamped, makes a variety of chemicals from coal. Many of these substances had never been made commercially before.

Hardinge

THICKENERS and HYDRO-SEPARATORS



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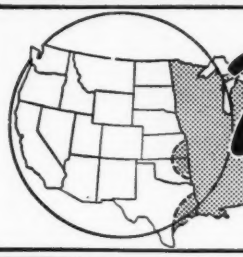

Western States

Hecla and Bunker Hill Exchange

The proposal for Hecla Mining Co. to exchange its 50 percent interest in the Sullivan Mining Co. for Bunker Hill & Sullivan Mining & Concentrating Company's stock has been approved. Stockholders of Hecla, meeting in Spokane, and stockholders of Bunker Hill, meeting in San Francisco, favored the proposal by wide margins. Bunker Hill and Hecla have been joint owners of Sullivan Mining Co. The transaction will increase Hecla's holdings of Bunker Hill stock by 275,000 shares, bringing their holdings to more than 19 percent. Bunker Hill will also buy Hecla's entire holdings in Pend Oreille Mines & Metals Co., 494,696 shares at $4.25 a share. Bunker Hill then will have a 36.49 percent interest in Pend Oreille.

New Trona Shaft

Intermountain Chemical Corp. has started sinking a 1600-ft shaft on its property near Green River, Wyo.

C. A. Romano, manager of the joint affiliate of Food Machinery & Chemical Corp. and National Distillers Products Corp. said the project would take about one year to complete. The 18-ft wide shaft will initially be used to increase the ventilation of underground workings and will permit Intermountain to proceed on a pillar recovery program which will nearly double the recovery of ore from the mine without greatly affecting production rate, Romano said. The new shaft will be used for air intake and an emergency escapeway. Shaft No. 1 on the property will handle men and materials and Shaft No. 2 will serve as an upcast air shaft.

To Quit Spodumene Production

Lithium Corp. of America, Inc., plans to place its South Dakota mining operations on standby basis early next year owing to surplus inventories of raw materials, according to H. W. Rogers, president.

The company stated that the earlier short supply of spodumene, the lithium mineral, had been overcome by development of new sources and that adequate inventories of this raw material had built up to a level adequate for many months. Further production from its mines, therefore, is to be curtailed.

Formerly the main source of lithium minerals, the Black Hills area is now affected by competitive sources of supply which enjoy lower transport costs and assured facilities for consistent and predictable production. Water supply has been a particular problem in the Black Hills the past two years.

The Corporation extracts lithium from its ores and produces 25 chemical compounds which have found widespread use in industry. Production of these chemical compounds is to be further increased.

The Corporation operates chemical manufacturing plants in St. Louis Park, Minn. and Bessemer City, N. C.

Climax Milling Expansion

Milling facilities of the Climax Molybdenum Co. operation at Climax, Colo., will be expanded in the near future according to Arthur H. Bunker, president.

Remodeling and enlarging of plant facilities will be undertaken to house a new ball-mill unit, largest single phase of the project. Robert Henderson, resident superintendent, said the addition will be used to either increase recovery of molybdenum by about three percent with no increase in tonnage, or to operate with an increase of about 3500 tons of ore per day on the present recovery basis. The project is expected to be completed within a year.

Oklahoma Cement Plant

Hercules Cement Co., Inc., a newly formed company, will build a $2,000,000 cement plant in Mayes County, Okla., near Tulsa. The plant has a planned capacity of 1500 bbls a day and will be located on a limestone deposit in the Fayette formation of the late Mississippian age. It will be the first cement plant to use this type of limestone, according to the company's organizers — a group of Tulsa businessmen.

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Utah Coal

Minerals Development Corp. of Colorado has signed a contract for the operation of the Somerset and Oliver mines recently purchased by the Columbia-Geneva Steel Division of the U. S. Steel Corp. The mines will produce between 10,000 and 15,000 tons monthly of coking coal for the Columbia-Geneva operation and approximately 5000 tons monthly of non-coking coal for sale to the commercial trade, according to Claude P. Heiner, president.

Reeves MacDonald Reopens

The Reeves MacDonald mine and mill in British Columbia near Metaline Falls, Wash., which were shut down in July 1953 because of depressed lead and zinc prices, have now resumed full production. Reopening of the mine was started the middle of October and milling was resumed November 1. Shipment of 5100 tons of zinc concentrates stored from former operations is expected to be completed before the end of November and shipments of current production have started.

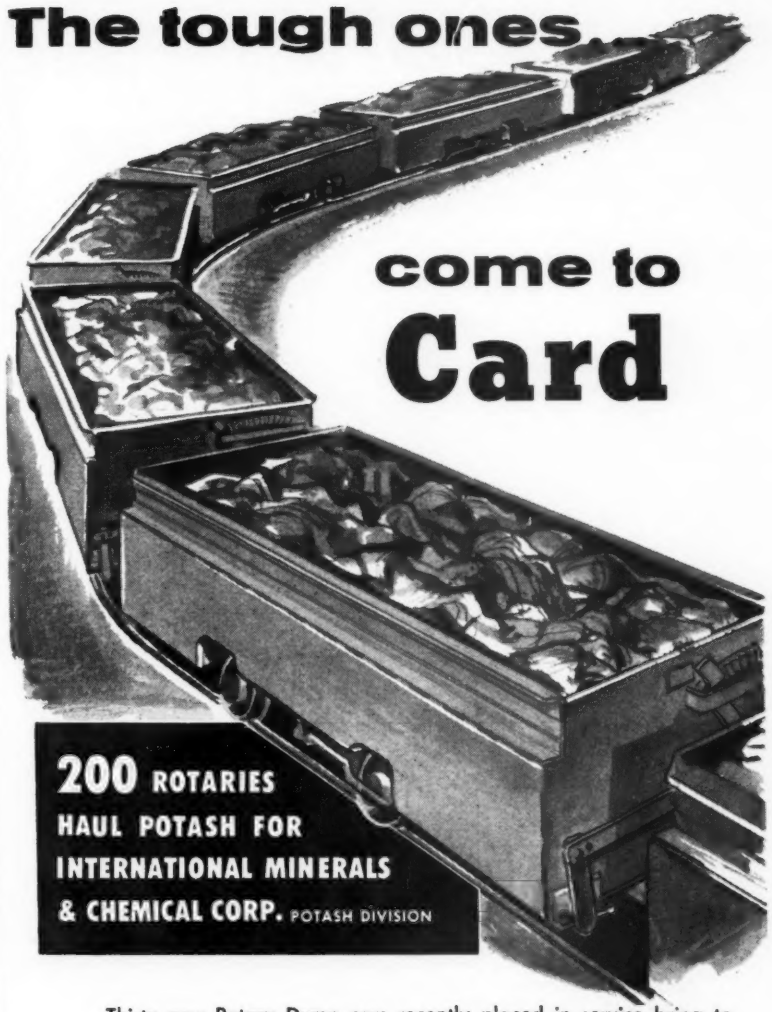
Nevada Tungsten Option

Minerals Engineering Co. of Grand Junction, Colo., has signed an option contract with Comstock Uranium & Tungsten Co., to mine what may be a substantial body of low-grade tungsten ore 21 miles east of Mina, Nev. R. G. Sullivan, Minerals Engineering's vice-president, said the decision to conduct mining operations will depend upon a drilling evaluation of the ore body which is expected to be completed by February 1, 1956. Should the property prove of value, Minerals Engineering will build a mill at the mine. Concentrates would then be shipped to the Salt Lake Tungsten Co. chemical refinery in which Minerals Engineering shares a 50 percent interest with Sylvania Electric Products Corp. Under the option contract, Minerals Engineering would receive 75 percent and Comstock Uranium 25 percent of any net profits from sale of concentrates.

Utah Mines Enrollment

Dr. Armand J. Eardley, dean of the College of Mines and Mineral Industries at the University of Utah, has reported that enrollment in the college is at an all-time peak. "An encouraging aspect of the fall quarter registration, which was 15 percent over that of last year, is the high number of freshmen students" Dr. Eardley said. "We have 52 freshmen, a 100 percent increase over last year." He added that enrollment this year was noticeably higher in geology, mining engineering and geological engineering.

The tough ones...



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200 ROTARIES HAUL POTASH FOR INTERNATIONAL MINERALS & CHEMICAL CORP. POTASH DIVISION

Thirty new Rotary Dump cars recently placed in service bring to an even 200 the CARD Rotary Dump Mine Cars now in underground use at Carlsbad. Potash does not give the impact punishment CARD cars are taking in so many hard rock operations, but conditions are still tough.

Trains are long; haulage distances constantly increase; grades grow steeper. To keep in full operation economically, the cars have to be easy rolling, strong of frame, and solidly built against mild corrosion. All wheels are Timken bearing equipped and live rubber pads are used instead of conventional steel springs. They are 152 cu. ft. in capacity, struck measure, and track gauge is 42".

Aside from a heavier draft gear to meet the requirements of steeper grades and heavier trains, today's cars are little changed from those in the original order. Four re-orders over a period of years prove customer satisfaction at International Minerals & Chemical Corp.

You, too, can customize your haulage with an economical CARD design. Our engineers can furnish an efficient car to meet your most difficult specifications.

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The ODOGRAPH M-1 mounted in a jeep or truck automatically maps the course followed while traveling at normal road speeds. Note: When used with Army or civilian jeep, tire size should be 6.00 x 16, however it can be used with any vehicle with speedometer drive of 1000 revolutions per mile.

The ODOGRAPH determines DIRECTION by a magnetic compass and DISTANCE from the speedometer drive of the vehicle's transmission. The M-1 combines these two factors mechanically in its plotting unit to produce corresponding movements in a plotting pencil on a map table. The chance of error is less than 1%.

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ODOGRAPH M-1 consists of three units: plotting unit, compass unit and power pack along with its electrical and flexible drive cables, spare parts, and accessories. Installed weight: 200 pounds.

MAP may be plotted on regular 8½ x 11 sheet or 10½ inch-wide 10 foot roll of 10 x 10 one-inch green grid paper contained in the plotting unit. A detailed map may also be placed in the plotting unit over which the course traveled is traced.

SCALE: Any scale from 1 to 20,000 to 1 to 500,000 on the Monroe Model and 1 to 20,000 to 1 to 800,000 on the IBM model may be plotted, giving a map area of from 2.40 x 3.15 miles to 60.1 x 79.40 miles on the Monroe or 2.40 x 3.18 to 96.16 x 127.04 on the IBM model.

The ODOGRAPH M-1 was designed and manufactured for U.S. Army Engineer Corps and has only recently been released for civilian application. The current manufacturer of these units sells them in excess of **$5,000.** The ODOGRAPH M-1 is now offered to you for the first time — as originally packaged — (specify type wanted, IBM or Monroe) at the low price of..... **$395.00**
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Vitro Mill Expansion

Vitro Uranium Corp., Salt Lake City, has announced that the signing of a long-term contract to purchase the output of the Hidden Splendor mine, discovered by Vernon Pick, "now clears the way for a 70 percent expansion of our Salt Lake uranium mill." The expansion of the mill will depend upon the successful negotiation of a milling contract with the Atomic Energy Commission.

The contract signed between Vitro and Hidden Splendor Mining Co., a subsidiary of Floyd B. Odlom's Atlas Corp., provides that Hidden Splendor will deliver a minimum of 5000 tons of uranium ore monthly with options to go higher to a maximum of 9000 tons a month. William B. Hall, general manager of Vitro, said that this ore, plus ores from Marysvale and the Temple Mountain District, with ore from miscellaneous shippers, warrants the investment in the expansion of the Salt Lake mill. The purchase contract covers either the life of the milling contract between Vitro and AEC or until March 31, 1962, whichever is earlier.

AIME Lists Awards

The board of directors of AIME has announced a series of awards to be made at the Institute's annual meeting in New York next February.

Henry DeWitt Smith of New York City, president of AIME in 1955, will receive the Charles F. Rand Gold Medal for mining administration. He retired as vice-president of Newmont Mining Co. in September 1954 but is still a member of the board.

Louis D. Buchman, formerly vice-president and director of Kennecott Copper Corp., Salt Lake City, will receive the William Lawrence Saunders Gold Medal for achievement in mining.

R. Livingston Ireland of Cleveland will receive the Erskine Ramsay Gold Medal for coal mining. He is chairman of the Executive Committee of Pittsburgh Consolidation Coal Co.

Arthur William Fahrenwald, former Dean, School of Mines, University of Idaho, Moscow, Idaho, is to be given the Robert H. Richards Award. This award recognizes achievement in any form which unmistakably furthers the art of minerals beneficiation.

Charles R. Kuzell, vice-president, Phelps Dodge Corp., Douglas, Ariz., will receive the James Douglas Gold Medal in recognition of distinguished achievement in nonferrous metallurgy, including both beneficiation of ores and alloying and utilization of nonferrous metals.

Elmer Allen Holbrook, former Dean, Engineering and Mines Schools, University of Pittsburgh, is to be the first recipient of the Mineral Industry Education Division Award in recognition

of his leadership in teaching and administration in the field of mineral industry education.

The Robert Peele Award to encourage young men in creative work in mining, geology, and geophysics and to recognize significant achievement in authorship in these fields will be awarded to Ingvar Janelid, professor of Mining and Surveying, The Royal Institute of Technology, Stockholm, Sweden.

Daniel C. Jackling Lecturer will be Dean James B. Macelwane, professor of Geophysics and Geophysical Engineering, St. Louis University. Dr. Macelwane is also Dean of the Institute of Technology.

Gilsonite Processing Plant

The first contracts for construction of the new processing plant for the American Gilsonite Co. near Grand Junction, Colo., to produce coke and high-test gasoline from Gilsonite mineral have been awarded to the Foster Wheeler Corp. of New York City, and Kaiser Engineers of Oakland, Calif., according to an announcement by E. F. Goodner, president.

Foster Wheeler Corp. will construct the delayed coking plant, and Kaiser Engineers will erect the calcining plant, utilities, and auxiliary facilities, Goodner said. The contracts involve a total investment of more than $5,000,000. Expansion of the Gilsonite mining operations at Bonanza, Utah, which will feed the new processing plant, is already under way. Gilsonite in suspension will be transported by a pipe line from Bonanza to Grand Junction.

Initial announcement of the project was made earlier this summer following several years of research and pilot plant development. It represents the first privately-financed commercial project for making conventional petroleum products from a raw material other than crude oil.

American Gilsonite Co. is jointly owned by the Barber Oil Corp. and Standard Oil Co. of Calif.

Calaveras Cement Expands

Calaveras Cement Co. has completed the concrete work on eight new storage silos at its San Andreas, Calif. plant. Erected by McDonald Engineering Co. of San Francisco, the silos will more than double the company's storage capacity for finished cement and are the first major units of a $4,000,000 expansion program which will include installation of a fifth kiln and related equipment at the San Andreas plant.

Each of the silos is 110 ft high with an inside diameter of 36 ft. The company's fifth kiln, which will be in operation late in 1956, will add more than 1,000,000 bbl of cement to the plant's annual productive capacity.

Airlegs vs. Jumbos

(Continued from page 28)

and resulted in very high tire costs.

One jumbo chassis with two hydro jibs mounted on it is proving satisfactory and apparently is acceptable to the drillers.

Jumbo with 35-ft telescoping mast at work

Assuming that a change is made to airlegs, it would require about 100 more drillers to break the rock required to keep the mill in tonnage. In addition, more powder men would be required, a larger drill steel inventory would have to be carried and there is a possibility that the crew of the drill steel shop would have to be increased. It is questionable if the present compressor plants would have sufficient capacity to carry that additional load.

Test Results Tabulated

In a quick summary, the airlegs have a definite place in certain applications but not as rock breakers on a large scale.

The tabulated statistics show the performance records of airlegs versus jumbo. In these columns, we have shown the mine with the poorest results, then the mine with the best results and an average of all mines, both for jumbo and for airlegs. These comparative results between the two types of rock drills are based on observations and records kept over many months of operation in the Tri-State Mines of the Eagle-Picher Company and should be used only as a rough measuring stick in other mining fields where all conditions are not reasonably comparable.

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If you don't have the Payroll Savings Plan, and are wondering whether your people would like to receive their bonus in Bonds, here are a few significant facts:

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—Payroll Savers hold their Bonds: From May 1, 1951, to September 30, 1955, approximately $18.7 billion E Bonds reached 10-year maturity dates. On September 30, 1955, approximately 70.3% of the matured bonds were retained by their owners under the automatic extension plan. With additional interest earned since maturity dates ($560 million), cash value of the matured bonds held by individuals amounts to approximately $13.7 billion.

—on September 30, 1955, the cash value of Series E and H Bonds—the kind sold only to individuals—totaled 39.7 billion dollars, a new high.

To the Payroll Saver, and to the man who buys his Bonds at a bank (because his company does not provide the Payroll Savings Plan) a One Hundred Dollar Savings Bond looks bigger and better and *is* bigger and better, than a check for $75. *Make this a merrier Christmas for every employee. Give the gift that keeps on giving.*

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

Mining Congress Journal

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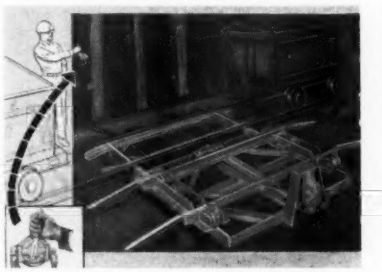
Air Powered Car Transfer

The American Mine Door Co., 2000 Dueber Ave., Canton 6, Ohio, has announced its new Air-Power Car Transfer. The company's hand powered model requires the services of three

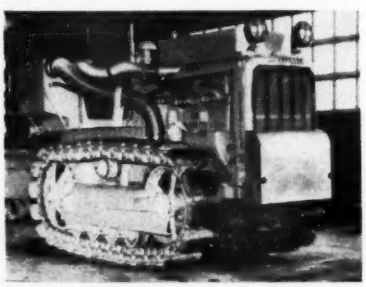


men for operation, while with the new air-powered model one man does the job, and does it faster. The air mechanism will transfer a six-ton load. The power unit is a reversible multivane air motor equipped with remote control valving. It is rated at 1.25 hp at 90 psi.

Complete information is available from the company.

Underground Diesel

The U. S. Bureau of Mines has recently approved another Cat Diesel track-type Tractor for use in non-coal underground mines. In a pilot operation a Caterpillar D2 Tractor operating in the iron range near Hibbing,



Minn., has been sanctioned. A similar D2 is working in a soda ash mine near Rock Springs, Wyo.

The modified D2 Tractor is approved with or without bulldozer and can be used with either a 24-v starting system or a 250-v starter. The 250-v starter is of the plug-in type.

Approval for use in underground non-coal mines is allowed only where the mine has 5100 cfm of air for each machine. In mine areas above sea level the tractor is derated to comply with the Bureau of Mines ration of exhaust gases to fresh air.

National Mines Service Co. made the exhaust conditioner used on the approved D2 and is the only one approved for use. This conditioner, the same unit as used on the D4, lowers exhaust temperatures to 160°F and removes some of the water soluble aldehydes which are obnoxious to personnel.

Sectional Tamping Pole

Lightness, strength, and flexibility have been combined in a sectional explosives tamping pole manufactured by Ideal Explosives Supply Co. The 10-ft pole sections are joined to form a tamping pole adaptable to any depth

hole, eliminating the necessity for excessively long, hard-to-handle poles.

For tamping explosives in either horizontal or vertical holes, the sections may be joined, by means of special slotted log-chain joints, during insertion and disconnected as they are withdrawn. Pole sections, 1½ in. in diameter, are hemlock of Douglas fir with joints of non-sparking magnesium-bronze. Any size wooden tamping plug may be attached to the end of the pole.

The sectional tamping pole has been used successfully to depths of 120 ft and on quarry, construction and river crossing jobs. The poles are available from Ideal Explosives Supply Co., 95 Craggy Ave., Ashville, N. C.

Link-Belt Absorbs Syntron Co.

Link-Belt Co. has announced that a plan for exchange of shares between Link-Belt and Syntron Co., of Homer City, Pa., has become effective. Syntron will be operated as a Link-Belt subsidiary.

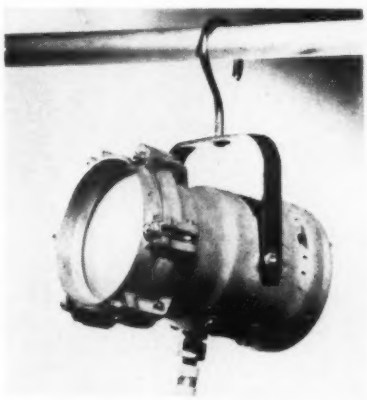
Portable Core Drill

A new, lightweight, portable, electric core-drilling machine with detachable bits for use by miners and prospectors has been introduced by the Demo Tool Corp., 8735 Melrose Ave., Los Angeles 46, Calif. Called the Demo DL875S, the drill weighs 37 lb and can still drill holes from one-half in. to 6 in. in diameter. It can be operated by one or two men on 9 or 12 amps, 60 cycle or less, 115V-ac-dc current. When no electricity is available, a gasoline generator is recommended. Air is used as a lubricant when drilling short holes; water on deeper holes. With coupled extensions, the drilling depth is 150 ft.

Air Powered Safety Floodlight

A new type of explosion-proof floodlight, powered by compressed air turbo-generators and cooled by exhaust air, has been introduced by Copco Eastern Ltd. The new 150-watt 12-v TGB 41 floodlight is especially adapted to mining, refinery and other industrial work where electric power is not always readily available.

The 22-lb semi-portable lamp draws 23 cfm of air at pressures ranging from 60 to 100 psi. Constant turbo-generator speed is maintained by spe-



cial reducing valves regardless of variations in the unit's primary air supply.

An automatic turbine cut-off ensures full safety in the event the blast-proof lens is shattered by external impact during operation.

Industrial Loader

A new and larger two-wheel-drive "Payloader" tractor-shovel, model "HAH," has been announced by The Frank G. Hough Co., Libertyville, Ill.

The new model, which has a struck capacity of ¾ cu yd and a heaped ca-

pacity of one cu yd, incorporates all of the features of the smaller "HA" model which was introduced in February. The new model has a breakout force of 4500 lb, a lifting capacity of 4000 lb and a carrying capacity of 3000 lb at four mph.

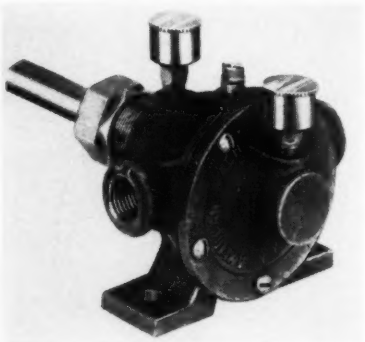
Especially designed for stockpile work, this new unit has a short turning radius and rear-wheel power steering. It has a lift of 7 ft 9 in.

Torque-convereter-drive and four-speed full-reversing transmission are combined with a gas engine developing 57 hp and travel speeds range from 0 to 14 mph in forward and from 0 to 23 mph in reverse.

Complete information and literature on the new "Payloader" may be obtained from The Frank G. Hough Co., 846 Seventh Street, Libertyville, Ill.

Neoprene Rubber Impeller Pumps

A new series of Neoprene rubber impeller pumps from ⅜ to 1¼-in. ips (iron pipe size) with flow ranges to 55 gpm has recently been introduced by American Machine Products, Inc., 172 Centre St., New York 13. Combining the best features of the gear



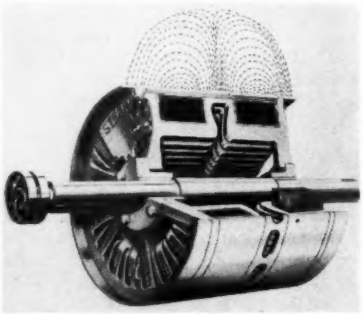
and centrifugal types, they are intended for use where a low pressure, low cost pump is required to transfer any liquid that does not affect bronze or Neoprene, with pressure range to 30 psi, depending upon model.

The impeller is replaceable at low cost and keyed to the shaft for easy application. The pump itself is made entirely of bearing bronze, while the shaft is stainless steel.

The unit is self-priming to about 15-20 ft when wet and should operate at the lowest speed commensurate with good delivery. Speeds range from 100 rpm to a maximum of 1750 rpm.

Magnetic Pulley

Stearns Magnetic, Inc., Milwaukee, Wis., has announced a new two-coil electromagnetic pulley for removing tramp iron. It is claimed that the new two-coil design produces a more effective flux pattern with a deeper magnetic field at the center of the pulley—a pattern which conforms to normal conveyor load conditions. The company reports that in many applications it is possible to install a



two-coil pulley of smaller diameter than a three-coil pulley handling the same job, thus reducing both equipment and power costs with no decrease in tramp iron protection. The two-coil construction is available in a variety of widths and diameters ranging from 12 to 60 in.

Change Oil Recommendations

A new recommendation covering the use of transmission oils has been announced by Caterpillar Tractor Co., Peoria, Ill.

Caterpillar now recommends that only an extreme pressure transmission oil conforming to the requirements of Mil-L-2105 specifications be used in the final drive compartments and transmissions of D8 Tractors Torque Converter Drive (Series D), D8 Tractors Direct Drive (Series E), D9 Tractors and No. 583 Pipelayers. The company is now filling transmissions and final drives of these units with Mil-L-2105 oil.

The Mil-L-2105 oils which are filterable may also be used in the transmissions and final drives of all other Caterpillar track-type tractors, wheel-type tractors and motor graders.

The company stresses, however, that it is important to use the correct oil because some Mil-L-2105 transmission oils are not filterable.

Viscosity or "grade" recommended by Caterpillar for various temperatures has not been changed.

Dredging Consultants

Ellicott Machine Corp. of 1611 Bush Street, Baltimore, Md., builders of dredges and auxiliary equipment since 1885, have inaugurated an office for research and development. This office, headed by Jacob Vandenberg, is set up to promote mining and production of minerals by means of dredging and hydraulicking.

Vandenberg graduated in 1927 from the University of Delft, Holland, as a mining and metallurgical engineer. He joined the Billiton Company, the Dutch tin mining and smelting enterprise, in the same year, and served them until 1951. From that year on, he was employed by the Mining Department of the National Lead Co., from which he resigned to join Ellicott as of August 1, 1955.

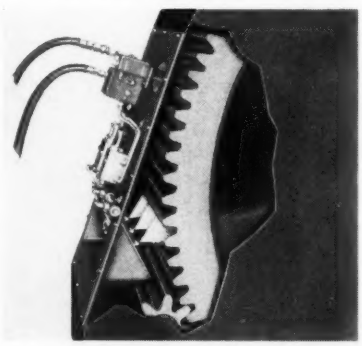
Osmose Gets New Line

The Pennsylvania Salt Mfg. Co., Philadelphia, Pa., has recently announced that the Osmose Wood Preserving Co. of America, Inc., Buffalo, N. Y., has been appointed exclusive sales outlet for the mining industry in the United States for the Pennsalt line of Neoprene products.

Lubricate Gears

"Spray Valve Panels," a new development by The Farval Corp., are designed to spray-lubricate bull gears, girth gears such as on grinding mills and kilns, and other spur or herringbone gear trains.

The self-contained panels are fastened to gear housings or framework and spray the lubricant directly to the pressure side of the gear teeth. Measuring approximately two by three ft, the panels feature stainless steel



spray valves having built-in nozzles. Central pumping units deliver gear lubricant at regular intervals through a circuit of Dualine measuring valves.

Description and illustrations on spray panels, along with data on all Farval Centralized Systems of Lubrication are contained in a new free bulletin, No. 26-R, available upon request to The Farval Corp., 3249 East 80th Street, Cleveland 4, Ohio.

Frameless Dump Trailer

A new "Frameless" Dump Trailer has been announced by Anthony Co., Streator, Ill. It is known as the Anthony Teleramic Frameless Dump Trailer. When dumping a load, the entire front end of the trailer is lifted by a single hydraulic telescopic cyl-

inder mounted on the tractor fifth wheel coupling. In raising or lowering, the trailer body pivots around the rear wheels, and during this cycle, tubular stabilizer arms, pinned both to the hoist-fifth wheel and the trailer body, give added support for a variety of loads and working conditions. The advantage of the new dump trailer design, according to the company, is that additional legal payloads up to 2000 lb can be hauled.

Automatic Pumping

Flood City Brass & Electric Co., Johnstown, Pa., has announced a new automatic system for operating centrifugal pumps. The new system, which can be applied to any existing or new centrifugal pump installation, is inexpensive and simple to install, the company reports. It operates a centrifugal pump automatically and eliminates the need for vacuum pumps in the system. Complete details are available from Flood City Brass & Electric Co. on inquiry.

Hard Surfacing Alloys

Coast Metals, Inc., Little Ferry, N. J., has announced a newly developed line of hard surfacing alloys. These materials consist of alloy-filled tubes, either in coils for automatic welding, or cut to length for manual application.

Goodman's Old-Timers

On November 2, Goodman Mfg. Co. held its tenth annual old-timers banquet. Diamond pins were presented to 15 employes who completed 25 years of service this year and to four who completed their 35th year. With these presentations the number of currently active employes who have reached or passed the 35-year mark is 73, while the 25-year or more class totals 130. In this group of old timers all phases of the business at the Chicago plant as well as district offices are represented.

—*Announcement*—

Chester G. Hawley has been appointed general manager of sales for the Industrial Division, **The Jeffrey Mfg. Co.**, Columbus, Ohio. The Industrial Division is one of the company's three main divisions and handles distribution of the firm's transmission, conveying and processing equipment.

Hawley formerly managed the O.E.M. Sales Department. **John Chrystal** has been assigned as manager of the O.E.M. Sales Department.

Jack H. How, president of **Western Machinery Co.**, San Francisco, has announced that effective November 1, 1955 the following executive appointments were made: **H. J. Mayer**, executive vice-president; **C. F. Skinner**, general manager of manufacturing, engineering and construction; **R. B. Utt**, chief executive engineer; **W. H. Newton**, general sales manager for Wemco

H. J. Mayer

C. F. Skinner

R. B. Utt

W. H. Newton

products and Western Knapp Engineering services.

Western Machinery Co. manufactures a complete line of equipment used in mining, metallurgical plants and process industries, as well as providing design and construction services and equipment for industrial developments.

A. H. Cunningham, sales agent for **Atlas Powder Co.** at Los Angeles since 1943 and a member of the Los Angeles explosives sales force since 1918, retired under the company's pension plan on November 1.

Appointment of **Charles A. Maloney, Jr.** to handle government and sub-contract sales of the **Fielden Instrument Division** of **Robertshaw-Fulton Controls Co.** was announced recently by Ralph M. Stotsenburg, division sales manager.

Gordon Ley has been appointed district representative serving the Colorado area, according to an announcement by **Electric Steel Foundry Co.**, Portland Ore. Address of the new Colorado Sales District is P. O. Box 534, Denver, Colo.

Directors of Cardox Corp., Chicago, have elected **John H. Bell**, board chairman; **Roy T. Omundson**, president; and **John T. Fitzgerald**, vice-president.

J. S. Gillespie, formerly manager of product planning, was appointed manager of the newly organized diamond project section of **Carboloy Department** of **General Electric Co.**, Detroit, Mich.

In his new assignment, Gillespie will be responsible for transforming laboratory techniques of making man-made industrial diamonds, developed by G. E.'s Research Laboratory, into practical production methods.

CATALOGS & BULLETINS

COAL SEPARATION. *Orefraction Inc., 7425 Thomas St., Pittsburgh 8, Pa.* This technical bulletin outlines the uses for Magnetite in heavy media washing and separation, particularly in preparing coal for marketing. Also included is a table of specifications of the physical properties of Orefraction Magnetite. Sizes from 50 to 325 mesh are tabulated, as are the specific gravity and percent of magnetics so that the most suitable Magnetite may be specified for specific separation systems.

CONE DRIVE GEARS. *Cone-Drive Gears, Div. Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich.* Bulletin CA-55 contains complete engineering details and assembly procedure of Cone-Drive double enveloping worm gears. Engineering drawings and sketches are included as are instructions for correcting misalignment. Requests should be addressed to Denham & Co., 925 Book Bldg., Detroit 26, Mich.

DRAINAGE AND CONSTRUCTION PRODUCTS. *Armco Drainage & Metal Products., Inc., Middletown, Ohio.* Catalog No. 10855 is a condensed illustrated catalog of the company drainage and construction products which includes corrugated metal pipe and pipe-arch; Multi-Plate pipe; perforated pipe; bin-type retaining walls; tunnel liner plates; Steelox buildings; steel sheeting; Flex-Beam guardrail; the new "Smooth-Flo" corrugated metal sewer pipe; and water control gates.

IMPROVED CABLE INSULATION. *Anaconda Wire & Cable, Co., 25 Broadway, New York, N. Y.* Results of laboratory tests and service records for the past several years on an improved butyl rubber compound for high-voltage cables are announced in Engineering Bulletin No. ED-27.

THICKENERS, CLARIFIERS AND AGITATORS. *Hardinge Co., Inc., York, Pa.* Bulletin No. 31-E describes the line of thickeners, clarifiers and agitators of the Hardinge Co. for mining, chemical, metallurgical and other industrial processing operations. Applications of the equipment are discussed and a formula is provided for determining tank diameters of thickeners for any given set of data.

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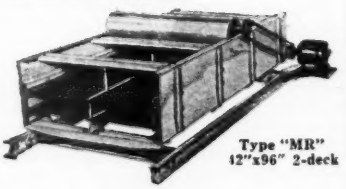

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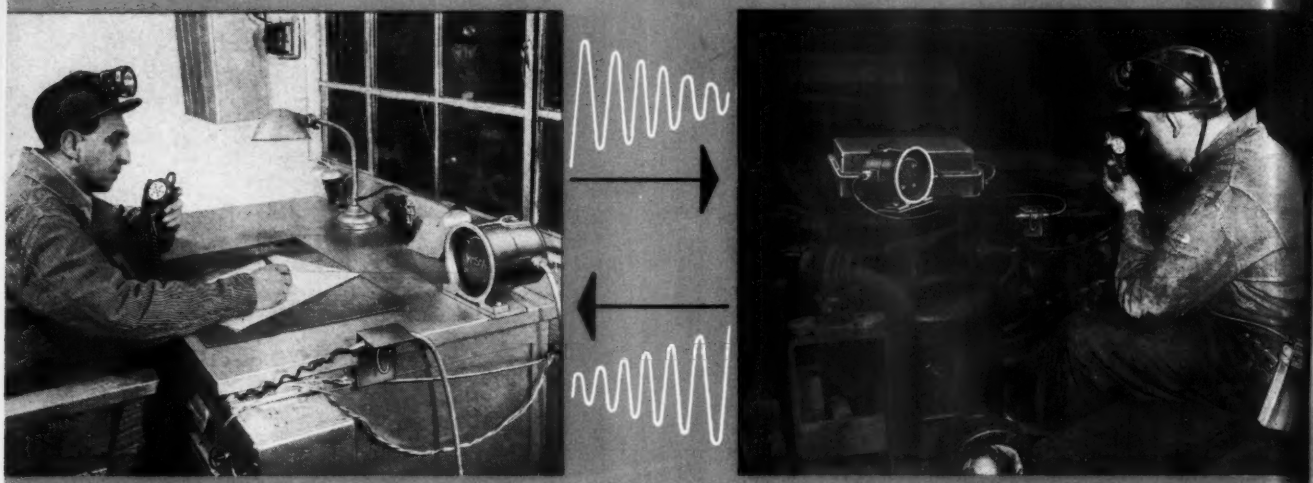

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